THE ENGINEERING AND MINING JOURNAL.

PUBLISHED AT 27 PARK PLACE, NEW YORK.

VOL. XI.—No. 6.—THIRD SERIES.] NEW YORK, TUESDAY, FEBRUARY 14, 1871. [SINGLE COPIES 10 CENTS.

The Characteristics of Lodes.

[From the Report of the U. S. Commissioner of Mining Statistics].

[Conclusion.]

THE filling of fissures is at once the most difficult and important and the least understood department of the science of ore-deposits.

I do not desire, in this place, to propound any theory of my own. There is scarcely room for a new hypothesis; and the truth is probably to be approximated by judicious eclecticism, allowing to many of those already set up a share in the results. The most important agencies are recognized in the very earliest theory, that of AGRICOLA, who, in 1546 and 1571,* ascribed the formation of veins to water, heat and cold. It is true, he assumed the transformation of other elements into metals; but many compounds were in his day considered as elements. Another ancient author, BALTHASAR RÖSLER,† declared veins to be filled fissures; and BECHER‡ distinctly asserts the activity of vapors from the earth's interior as a cause of their occurrence. These and other following authors were more nearly correct than the great WERNER, who gave his powerful authority to the theory that the vein-material is in all cases a precipitation from above into the fissures, from a solution (or mechanical suspension in water) covering the surface of the region, at the time when the fissures were open. Facts were too much for WERNER's theory, and an extreme reaction showed itself in the injection hypothesis, according to which veins were formed by the injection into the fissures of melted matter from below.

This had the phenomena of volcanoes as analogical support; but volcanic eruptions appear in all ages to have produced only volcanic rocks; and the type of these is well marked; so that the analogy really overthrows the theory, which must be rejected for all except eruptive veins, frequently called dikes.

ELIE DE BEAUMONT declares veins to be the products of volcanic emanations; but includes under this name thermal-aqueous solutions and metalliferous and sulphurous gases, as well as melted injections. In this extended sense, his explanation will doubtless apply to the majority of cases. The opinion that in most veins the material did not enter from the surface, nor from the country-rock immediately adjacent to the place of its present deposition, is now entertained by all.

It is especially in this country that light will be thrown on the subject. Our vast gold and silver belt (particularly the latter) abounds in illustrations of all stages of volcanic action, direct and indirect. It is the scene of earthquakes, geysers, and metallic depositions still, and the barren surfaces of its mountain ranges give unequalled opportunity for the study of results already wrought out by these processes. I think the contribution to geology from the Pacific slope and the inland basin will effect three things: It will restore to volcanic agencies a portion of the importance which chemical geologists have lately been prone to deny them; it will afford fresh illustrations of the metamorphic action of chemical solutions, vapors, and gases; and it will show the filling of veins by thermal-aqueous and solfataric action. In other words, it will vindicate the geological importance of fire, gas, steam, and hot water, all produced from subterranean sources.

A few veins contain ores deposited by sublimation (especially specular iron, frequently found in volcanic fissures); and another class may have been filled by secretions from the adjacent country-rock; but of the vast majority of ore-veins, we may assert that they were filled from below (if from the country-rock, then at greater depths than we can attain), and by means of solutions, vapors, and gases. The distribution of ore in this way is affected, no doubt, by many causes which we cannot now trace. It seems to me that the essential elements of the problem are the condition of the fissure at the time the ore entered it, and the nature of the deposition of ore, whether mechanical, as by the cooling of a sublimation or the evaporation of a solution, or chemical, as a result of reactions producing insoluble precipitates. The condition of the fissure is important, as one or two suggestions will show. Its width, for instance, would determine currents and their rapidity, and thus affect the mechanical deposition, even of chemical precipitates. Horses, and lines of contact between the walls, or even mere contractions without contact, would cause the fissure to be choked at some points and in some lines earlier than at others; and subsequent depositions of ore would take place in chimneys, or ore-bodies, in those spaces to which the currents found readiest access. With regard to the second element mentioned—the nature of the deposition—it may be said to be essentially mechanical, whether the precipitates are already formed and held in suspension, or are formed by cooling or by chemical reactions subsequent to their entrance. The deposition of the former, however, is perhaps more dependent on the fissure: that of the latter, on the nature of the country-rock. Probably little, except clays, etc., is brought into veins in mechanical suspension. The majority of cases indicate crystallization by cooling and chemical change. A simple laboratory experiment will show what are the most obvious effects of the wall-rock upon this process. Let a hot solution be placed in a vessel constructed partly of glass, partly of metal, partly of polished wood, and partly of rough wood. As the liquid cools it will be seen that the crystal incrustations are deposited unequally, according to the varying capacity of these different substances to conduct heat, and according to their surface. The best conductors and the most rugged surfaces receive the earliest and most abundant deposit. The difference in surface is probably only an element of the conduction of heat; so that we may say in general that the best conductors of heat receive the largest crystalline deposits. The specific gravity of substances is directly connected with their conduction of heat. Hence, rough walls, of a rock of high specific gravity, would naturally be the localities of crystallization in veins. This is only saying that solutions or vapors crystallize first where they cool quickest. The frost on a window-pane is an illustration. Whether this crystalline deposit will be ore or gangue, depends upon the nature of the solution or vapor first entering the fissure. There is also, in many cases, a chemical reaction between the solution in the fissure and the wall-rock. Certain ingredients of the rock change places with others in the solution. Thus, for instance, chalybeate and other mineral waters contain bi-carbonates of iron, lime, etc. These, by the absorption of more iron or lime, would become common carbonates, and insoluble. The wall-rock of the fissure may supply the additional base, and the result will be a crystallization of iron or lime spar in the vein, while the wall-rock becomes porous, or, receiving new ingredients (silica, etc.), in place of those it has surrendered, presents a zone in the neighborhood of the vein of very different character from that of the general country-rock. These reactions have been studied a good deal of late; but there is much to be still explained concerning them. I will only add here that not only the chemical constitution, but also the texture of the wall-rock, promotes or prevents such processes. A porous rock, or one that (like some porphyries) presents considerable surfaces of combinations easily decomposed (alkaline silicates, etc.), will be acted upon easily, while a solid, homogeneous rock would resist decomposition.

The crossing of two veins may assist the deposition of vein matter both mechanically and chemically. The supposed electrical currents in the rocks have also been appealed to; but their activity is not proved beyond the realm of galvanic or electro-chemical effects; in other words, of chemical reactions.

Finally, the distribution of ore in a vein is to be considered as a series of relative concentrations. The absolute or total richness of the vein must depend upon the amount of metallic substances introduced into the fissure. This we can only infer from the size and general metalliferous appearance of the vein. The practical distinctions of miners, as to "strong" and "well-charged" veins are, therefore, quite in accordance with theory.

Among the indications which throw light upon this important question, in advance of thorough explorations, are the traces of extensive chemical changes in the vein and adjacent rock, and especially the traces of superficial decomposition by meteoric agencies. The valuable metal, such as silver or copper, may have been almost entirely removed by these changes; but the indications of its presence may remain. This is the significance of the "iron hat" or gossan which form the outcrop of many valuable copper, silver, and gold veins. The changes above water-level, in most veins, consist in oxidation or chlorination, solution and removal of some ingredients, and sometimes reduction and precipitation. Thus the gossan outcrops are produced by the oxidation of sulphurets, etc., and the removal of soluble sulphates. Sometimes these soluble salts are again precipitated below, as in Tennessee and Virginia, where percolating surface waters have oxidized pyritic deposits to gossan, and carried the copper sulphates down in solution to the lower drainage-level, where they have been precipitated by iron or organic substances as a zone of "black copper." In many cases the water-line, or line of deepest drainage for surface waters, is characterized by a barren zone in the vein. This is called, in some localities, the cap-rock; but, like the alleged regular systems of chimneys of ore in veins, its universal occurrence is by no means proved. Miners in Colorado, for instance, call all barren sections of a vein cap-rock, while every body of good ore is a chimney; and this is about all that science could safely say in the case. The occurrence of relatively barren spaces in veins is inevitable and universal. It is discouraging to the expectation of future success or not, according to the size and metalliferous character of the vein. On the Comstock vein, for instance, the extent and number of the ore-bodies already explored, forbids the supposition that the vein is barren in depth, while the extent and number of the barren spaces, already explored, justifies the apprehension that the alternations of rich and poor ground in depth will be on an equally large scale.

Characteristic for veins are the selvages or layers of clay (fluccan) along the walls. These are sometimes wanting in true veins; but never, so far as I know, are they found distinctly developed in beds.* They result from the percolation of water along the walls, the pressure and slight movement of the latter, and the chemical changes caused along the plane of contact between vein material and counter-rock. In some districts they are called "gouges," because they enable the miner to work with a pick between the vein and the wall, and so to expose a side surface, which greatly facilitates blasting out the vein. The mother lode of California is noted for the wide gouge along the foot-wall. The vein is thus easily stripped, and large quantities of quartz are thrown by a single blast. I saw a piece weighing about twenty-five tons, in the Amador mine, thrown down in this way; and much larger quantities have been lifted and and loosened by single blasts in that mine.

In concluding this prolonged, yet merely outlined discussion of veins, I would once more urge the suggestion which constitutes its most important feature, and for the sake of which I have written the whole. It is the vital necessity of less general theory and more particular study. Engineers in practice might well throw away half their notions about *all* veins, and substitute a clear and definite comprehension of *some* veins. Our country will certainly afford new and striking facts in this department of science; but they must be observed carefully, and not seized upon, to be pressed into the support of crude generalizations or preconceived theories. Our mineral deposits represent all classes and all modes of formation, and will not be ranked under any man's pet hypothesis. Meanwhile, for their successful exploitation, it is sufficient and essential to rely upon the acknowledged principles of safe and wise engineering, and upon faithful and intelligent local observations.

Beds and seams.—Veins, as we have seen, are characterized to the eye of the miner by the following signs: sheet-form; linear extension in length and depth; generally steep dip; irregularity of ore-distribution; relations with other parallel or intersecting veins; and indications of a previous fissure, filled with matter of later origin than the country-rock.

Beds, on the other hand, while they have the sheet form, approach the horizontal plane in their original position (though they are tilted wherever the inclosing rocks are also tilted), have no particular connection with other parallel beds (since these must be older or younger, according to their position above or below, but never of the same age), contain their ores or valuable minerals more evenly distributed. They are frequently faulted by cross-fissures, but cannot themselves be the cause of faults in other deposits. The principal ores occurring in beds are those of iron, copper, lead, zinc, and sulphur. Many gold deposits in the Southern States are probably beds—that is, layers of the country-rock, distinguishable from the overlying and underlying strata by their greater proportion of quartz and gold. Beds of valuable minerals are frequently found in the form of basins, or in lenticular form, thinning out on all sides. They have also their variations in thickness and dip; but these are much less common and less violent than those of veins. Beds are also subject, like veins, to internal metamorphosis, by means of chemical reactions, percolating waters, etc.

Mass-deposits are still more various in their methods of formation than veins. Both the preparation and the filling of the mold, so to speak, may have taken place in many different ways. Some masses are deposits, chemically and geologically analagous to those of veins, except that they have taken place in caves or irregular spaces in the rocks, not fissures in the usual sense. Thus the lead ores of Illinois, many iron ores in dolomite and limestone, etc. Other mass-deposits are, strictly speaking, networks of small veins; as, for instance, the chrome-iron ores of Pennsylvania. Others are produced by the penetration of metalliferous solutions into porous or decomposable rocks, and the gradual impregnation of the latter. Finally, a mass-deposit may be the result of more than one of these processes. It is even more emphatically of these deposits than of veins that each example needs to be studied by itself. There are no general rules which will serve to guide, either in the discovery or in the exploration and working of such deposits.

Impregnations are to be considered as in some sense a variety

* De Ortu et Causis Subterraneorum; and De Re Metallica.
† Der Hellpolirte Bergbauspiegel. 1700.
‡ Physica Subterranea. 1703.

* Beds highly tilted, so as to have maintained for an indefinite period a position like that of most veins, are sometimes observed to have a sort of selvages; but there is no natural separation, in most cases, along the walls, any more than in the strata-cleavages of the deposit itself. Hence such beds may show fluccan anywhere in their mass.

of mass-deposits. Their characteristic feature is the absence of defined limits. They are limited for the miner by the gradual decrease in richness, reaching finally a point where it will not pay to work them. They frequently accompany other deposits as a sort of indefinite boundary; but they also occur independently. The silver deposits of White Pine are to be classed (so far as I can at present decide) as masses and impregnations in certain strata of the limestone. The Eberhardt mine illustrates the fact that deposits of this kind may be faulted as well as veins. The mass-deposit of the Eberhardt is sharply cut off on the north, and less sharply on the south, by what seem to be cross-fissures.* The uncertainty under which the miner labors as to the extent and form of mass-deposits is, as COTTA well remarks, fortunately counterbalanced by the usually large dimensions of this class of deposits, and, as I would add, by the comparative small depth, and the consequent ease and cheapness of extraction and of exploration. All these points are illustrated in White Pine.

Passing over without further remark the subject of pockets and small segregations, I will close this chapter with a general list of the occurrences of the precious metals.

Gold occurs in veins, beds, and pockets; in impregnations of rocks, (slate, granite,† &c.;) in placers, &c.; ordinarily native, but frequently associated with sulphur, arsenic, &c., and accompanying silver, copper, or iron.

Platinum is distributed similarly, but has never been profitably obtained, except from placers.

Silver is found in veins, beds, nests, masses, impregnations, &c., really native, and not generally in ores of silver only, but rather as an accidental constituent of lead and copper ores. Large portions of the silver belt of the United States are characterized by unusual purity of silver ore and freedom from base metal. I think it likely, however, that this distinction will vanish in depth. Even at present, the ores sent to mill are in most cases kept free from base metal by throwing away, in sorting, the base metal compounds. The utilization of the base metals themselves, or at least the economical treatment of their argentiferous ores, is necessary to permanent prosperity in silver-mining.

Coal Mining in England.

THE difference between the manner of working coal mines in this country and England will render the perusal of the following article, from the *Colliery Guardian*, an English paper devoted chiefly to the coal and mining industry of Great Britain, not without interest to American coal men. The mines described are of course representative ones of the Northumberland district: and have a history as interesting as any in the world. Stephenson's lamp is a much safer one than that of DAVY, as it is extinguished automatically by explosive gases.

The four collieries of Killingworth, Gosforth, Seaton Burn and Dinnington winning, form another section of the mineral property of Messrs. JOHN BOWES, C. M. PALEER & COMPANY, of which Mr. S. C. CRONE is viewer. The area of mineral property belonging to and leased by the firm under this section is 8242 acres. Killingworth Colliery is well known as being associated with the labors of GEORGE STEPHENSON in the invention of the miners' lamp which bears his name. He was for many years a resident at Killingworth, first as a breaksman, and afterwards as engineer over the colliery works. The colliery was then under the management of NICHOLAS WOOD, and experiments on the nature of the gases found in coal mines were conjointly made by them, which led to the introduction of STEPHENSON'S lamp in 1815. His contemporaries—Sir H. DAVY and Dr. CLANNY—also produced their lamps about the same time, the result of their investigations on the nature of flame. Each of the three classes of lamp has its distinctive features, and they are at the present day the most generally used in coal mines; but, with the exception of the Stephenson lamp, they are by no means to be considered as safe lamps under extraordinary circumstances.

The Killingworth and Gosforth properties are remarkable as being situated on the line of the great 90-fathom dyke; the name indicates the throw of the dyke to the west at Tynedale Fell, where it was first observed; but its throw at Gosforth is ascertained to be not less than 170 fathoms down to the north. This dislocation, having occurred subsequent to the deposition of the beds of coal, causes some difficulty in accounting for the arbitrary changes in the quality of coal on the respective sides of the dyke. The High Main seam is not altered in its characteristics to the north and south of it. At Gosforth, the Low Main seam produces steam coal on the south side of the dyke, but partaking more of the character of house coal on the north side; as this seam has only recently been reached, and not explored to any extent, the change probably is merely a local one. The reverse of this holds good to the eastward; the seams below the High Main seam north of the dyke produce steam coal, those on the south side second-class house coal. In the early period of the working of Killingworth Colliery, miners' lamps were unknown. One pit was used for the operations of raising coal, pumping water, and for the inlet and outlet of air; the quantity of air circulated in the mine was small compared to what is required by modern practice. It does not excite surprise now to learn that explosions were frequently occurring in the early periods in mines where gas, even in moderate quantity, was thrown off. After the introduction of lamps, in 1815, accidents were still taking place, owing probably to the use of candles in mines, and to their defective ventilation. Happily, these accidents are now of rare occurrence in the northern coal field, since their causes have been inquired into and have become better understood. The safety of coal mines is found to be dependent on the workings being scientifically arranged, on copious streams of air put in circulation through every part, and rules for the guidance of workmen and overlookers strictly attended to; these combined have produced a much improved state of things, the result of years of dear-bought experience, and of a great amount of scientific knowledge brought to bear on the subject.

Killingworth Colliery.—The present coal pit, or Westmoor Pit, was commenced sinking in the year 1800, and coal working in 1803. It is 14½ feet in diameter to the High Main seam, 114 fathoms in depth; 20 fathoms of wood curb-tubbing was inserted while it was being sunk, which is still good and effective. The pit to this depth is divided into four quarters by wood brattice—one quarter is for the pumps; the B pit quarter is for raising coal from the High Main seam, this division being too small for the cages to pass, is enlarged at the middle for this purpose; the two other quarters are deepened by a pit sunk in each, 7 feet in diameter, 60 fathoms lower, the whole of the 60 fathoms in each pit is secured by cast-iron tubbing. From this depth—174 yards—a stone drift is driven across the measures, nearly level, 800 yards in length, which intersects the Low Main, Bensham, Yard, and High Main seams. This drift was necessitated, owing to the bending down southward of the measures for about 1000 yards as the 90 fathom dyke is approached; commencing at 1 inch per yard at the pit, the dip increases to 8 inches per yard at the drift end, and to 16 inches per yard adjacent to the dyke. By this drift the dip part of the High Main seam has been brought out. The coal is supposed to be worked close up to the dyke, continuing good in quality, but water impeded the operations here; it was raised in tanks from the dip. The Yard seam is now got from the levels driven laterally from the drift. In the two quarters of the pit last named, called the A Pit, the Yard coal is now raised from the lower level, 174 fathoms, by a separate engine. The whole of the pit is downcast, the upcast being situated 1500 yards eastward, and is 90 fathoms in depth.

The B Pit winding-engine has a 36-inch vertical cylinder, 7-feet stroke, wrought-iron levers, 15-feet flat-rope drums, fly-wheel and foot-brake; these are supported intermediately by wood framing. The engine raises about 240 tons per day, in four-decked cages, four 6-cwt. tubs in each cage. The counterbalance is a loaded wagon running on an incline.

The underground hauling-engine is placed at the top of the pit; it has two 30-inch horizontal cylinders, 5-feet stroke, wheels in ratio of 1 to 1½; two drums on separate shafts, two slide-carriages to each. The main rope drum is 12 feet in diameter. With this drum the engine formerly hauled up the bank in the High Main, from the extreme dip workings near the dyke to the stone drift. This is now abandoned, and the engine, with a 10-feet tail-rope drum added in front of the other, is now applied to hauling in and out on a plane in the High Main at the higher level; eight plain boilers, 30 by 5½ feet, covered with fire-brick, supply the A Pit and hauling-engines with steam, at 42 lbs. pressure. The boiler-feeder for these is a 6-inch inverted engine, by HORSELEY.

The pumping-engine dates from the commencement of the colliery, and is now standing and worn out; it is a 54-inch double-acting beam condensing engine, 9-feet stroke; the front beam is a trussed wood beam, the back one is a plain wood beam. The engine raised water in four lifts, from the depth of 120 fathoms, each lift 30 fathoms. The first lift, 13-inch bucket, was worked by diagonal rod from the cylinder end and V-bob; the three upper ones, 12-inch buckets, were worked from the outer end of the main beam. Two plain boilers, one 25 by 6 feet, one 20 feet by 6 feet, supplied the engine with steam at 7 pounds pressure. Water is now raised by both winding-engines, in tanks, for eight hours each night.

The engine-plane in the High Main seam is 1800 yards in length, from the shaft to the return wheel; it proceeds north-west the greater part of that length, and afterwards north. The engine pulls this length in and out by main and tail ropes in seven or eight minutes, 30 tubs at once; the main rope at the top of the pit passes over an 8 foot pulley, the tail-rope over a 6 foot pulley; at the bottom of the pit both pulleys are 6 feet in diameter; the ropes pass down the A pit, and are not enclosed. About two-thirds of the B pit drawing is brought out by the engine. The High Main seam is worked beyond the extremity of the engine-plane, from Gosforth property, in a panel consisting of 21 west bords, the wagon bord having eight bords north and twelve on the south of it. The cleavage is about north 20° west; the rise is 1 inch per yard northward; the pillars are made 29 yards, by 20 yards, bords 4½, walls 2 yards in width. The Stephenson lamps are used solely here; powder is not used, wedging is substituted.

Section of the High Main seam in this panel:—

1—Metal roof, inferior.		
2—Coarse coal	0 ft.	9 in:
3—Stone band	0	1½
4—Good coal	3	10
5—Coarse coal	0	8=5 ft. 4½ in.
6—Shale mixed with coarse coal	2	6
7—Crow coal	2	0
8—Fire-clay, not used.		

The upper beds = 5 feet 4½ inches only are worked. Nos. 2 and 5 are separated from the good coal; the latter is hard and of excellent quality. The Yard seam is 3 feet 7½ inches in thickness, including shale band of 2½ inches. The pillars in this seam are made 29 by 20 yards, bords 5 and walls 2 yards in width. Lamps are used for lighting the mine. Powder is used for blasting the coal, but under strict regulations; the deputies alone are permitted to fire shots, first satisfying themselves that no gas is present, either in the working faces or in any workings near. This precaution is the more necessary, owing to the workings being driven to the rise of the seam, which is about 4 inches per yard; the explosive gas given off from the coal by its natural lightness hangs about the working faces, and is the more difficult to dislodge. The rules for use of the safety-lamps by the hewers are here rigidly enforced; not the slightest infringement of these rules is allowed. Section of the Bensham seam:

1.—Coal	1 ft.	8½ in.
2.—Coarse coal	0	2
3.—Coal	1	1
4.—Splint band	0	3
5.—Coal	1	6=4 ft. 7 in.

This seam is not worked, nor is it likely to be for some time to come. The Low Main measures 2 feet 6 inches in thickness in the drift; it is not yet worked. The Beaumont, or Harvey, seam is bored to from the bottom of the small pit, and found to be 3 feet 6 inches in thickness; this seam usually produces gas and cooking coal in the Wear district.

The air in circulation through the whole			
of the mines at the upper level is	25,000	cubic feet	per minute.
" at the lower level is	26,000	"	"
Total	51,000	"	"

Two furnaces, 8 feet and 6 feet in width respectively, heat the upcast column. Besides the hauling engine, there are six horses and fourteen small ponies employed in the conveyance of coal underground. The Killingworth workshops comprise smiths' shop, containing five fires blown by fan; joiners' and fitting shop (the latter contains five machines); these, with the fan and circular saws, are driven by a 15-inch vertical engine. Gas-works are erected near the pit.

Gosforth Colliery.—Two pits are sunk, 12 feet in diameter, 10 yards apart, 190 fathoms in depth. The sinking of these was commenced in the year 1824, and the working of coal in 1828. The High Main seam had previously been nearly exhausted on the south side of the 90 fathom dyke, for which several pits had been put down. The depth to this seam is 35 fathoms in the present pits. Walling set in cement was inserted at this part of the pit for damming back the water accumulated in the old works; this has recently been replaced by cast-iron tubbing. No water is found below this. At the depth of 85 fathoms the Low Main seam is got, and is worked to the extent of 100 tons per day. It is understood the coal measures are not bent over on the south or rise side of the dyke, as they are on the north side. The Brockwell seam is intersected at the depth of 160 fathoms, not worked at present. From the depth of 180 yards two stone drifts are driven from the pits in a north direction, rising ⅛th of an inch per yard. At 300 yards the 90 fathom dyke is crossed; at 600 yards the High Main seam (rising greatly to the north from the dyke) is again reached, and the workings and goaf areas in this seam north of the dyke are very extensive. The drifts are extended further to the Low Main seam=1050 yards, in a direct line from the pits. The downcast pit is divided equally by wood brattice, one-half being the coal shaft and the other half for pumps. The downcast winding-engine is a 40-inch beam condensing engine, 6½-feet stroke, direct acting, 17-feet flat-rope drums. Four plain boilers, 20 by 6 feet, under cover, supply steam at 12 lbs. pressure. The engine raises about 370 tons per day in two-decked cages, two 8-cwt. tubs in each cage. About 250 tons is from the lower level, and 100 tons from the Low Main, or 85 fathom level. A similar winding-engine is erected for the upcast pit, which has been used for raising coal; at present it is in reserve for raising men at the upcast, one cage and rope being provided for this purpose. The pumping-engine is a double-acting, non-condensing beam-engine, 51-inch cylinder, 9-feet stroke; it goes day and night at the rate of five strokes per minute, and raises water from the depth of 191 fathoms. The first and second lifts are each 48 fathoms, 12-inch buckets; these are worked from the outer end of the beam. The third lift is 12½-inch, and the fourth, delivering at the surface, is a 13-inch bucket; each lift is about 47½ fathoms—these two are worked by a diagonal rod from the cylinder end of the beam, connected to a 15-inch wood beam, and also to the pump-rods. Six plain boilers, 20 by 6 feet, supply this engine with steam at 32 lbs. pressure. Boilers fed by the large engines, or by an 8-inch cylinder donkey engine.

A hauling engine near the bottom of the upcast has two 20-inch horizontal cylinders, 3-feet stroke, wheels in ratio of 1 to 1½. Two drums on separate shafts, 6 feet in diameter, moved by slide carriages; each drum has a clear front. The fly-wheel on the main shaft weighs 4 tons. Two plain boilers, 25 by 5½ feet, fixed about 30 yards from the engine, supply it with steam at 35 lbs. pressure. The boiler fires also serve to heat the upcast column, and, with the escape steam, is the ventilating agent. Quantity of air in circulation, 40,000 cubic feet per minute. The boilers are fed by pressure got from 19 fathoms of pipes up the pit, equal to 50 lbs. per inch at the boilers. The engine-plane proceeds 600 yards along the drift, from thence curves round to south east, and is extended 400 yards further towards the dyke, at an inclination of 4 inches per yard, about half the full dip. Twelve tubs are run at once, worked in and out with tail and main ropes. The pillars are being worked off in this quarter. The coal here is 5½ feet in thickness, all good, with post roof. Water is given off in considerable quantities in approaching the great dyke. For draining these workings two pumps are fixed. One pump works direct from the shaft of the return wheel, with a double-acting 4-inch plunger, 2-feet stroke; it is in operation when the engine is hauling. Another pump, with two 8-inch rams, 18-inch stroke, is worked when the engine is not hauling, by passing an additional piece of rope over two wheels, this rope being connected to the main rope by links. The Low Main seam is found at the end of the stone drift, 3 feet 4 inches thick, with a small band in it, and of the household quality. On the south side of the dyke, where this seam is worked direct from the pit, it produces steam coal, which is the opposite of what generally proves to be the case at collieries further eastward. There are workshops at Gosforth, and one 12-inch horizontal engine, which drives circular saws; and gasworks for lighting the shops, streets, and the top of the pit.

Seaton Burn Colliery.—This has been thirty years in operation. One pit, eleven feet in diameter, is divided by brattice,

* See chapter on White Pine, in the Commissioner's Report.

† I have seen gold disseminated in true tribasic granite from Southern California, and a similar instance is reported to me from Mammoth district of Nevada; but in the latter case I have some reason to doubt the nature of the granite and its actual impregnation.

for coal work and pumps; this pit is also the upcast for the colliery. The downcast is a special air-pit, on the Blagdon estate, one mile distant. A new pit, intended for an air-pit, is being sunk at Brenkley, one mile and a quarter distant. The winding-engine has one thirty-inch horizontal cylinder, five and a half feet stroke, direct-acting, one thirteen and a half feet cylindrical drum; fly-wheel thirty feet in diameter, and foot-break; it raises about six hundred tons per day, in two-decked cages, two eight cwt. tubs in each cage, from the depth of fifty-nine fathoms. The pumping-engine is a double-acting beam-engine, forty-inch cylinder, six feet stroke, with a back lever; it raises water in two lifts; the lower lift is thirty fathoms, eighteen-inch bucket, six-feet stroke, in the pit; the upper lift is thirty fathoms, twenty-inch bucket, four and a half feet stroke; this is placed in a staple within the house, and worked from the back lever. The engine goes day and night, at the rate of eight strokes per minute. Eight plain boilers, thirty feet by five feet, supply these two engines and an engine underground with steam, at forty pounds pressure. The colliery being very heavily watered, the underground hauling-engine is at present used as an auxiliary for pumping; this engine has two sixteen-inch horizontal cylinders, three-feet stroke, wheels in ratio of one to two. It is intended to haul with a six-feet clip-wheel and endless rope. The engine works direct one double-acting pump, six-inch plunger, three-feet stroke; eight-inch mains are fixed in the pit. The boilers are usually fed by the pumping-engine. There is a boiler-feeder-six-inch inverted cylinder, four and a half inch ram, which may either be used for this purpose or as a fire-engine.

The Low Main seam ranges from three feet to four and a half feet in thickness, with moderate roof. The rise is N. 25 W., at the rate of one and a half inch per yard. The cleavage runs both north and south, and east and west; there is also a less distinct cross-cut cleavage. The pillars are made thirty-three by sixteen yards, the bords six yards, the walls eight feet in width. The pillars are taken off by a jenkin and cross-lifts, chocks being largely used. Little gas is emitted from the coal, and lamps are only partially used in pillar working. An engine-plane, one mile and six-tenths in length, is made in a north-west direction, with a west branch from it, and is ready to be put into operation when the engine can be applied, as at first designed. The underground conveyance of coal is effected at present by sixteen self-acting inclines, and twenty-eight horses and small ponies.

Dinnington Winning—Is situated one mile south of Seaton Burn pits. There are two pits, thirty-seven yards apart from their centres, the Augusta pit, fifteen and a half feet, and the West pit, twelve feet in diameter. The West pit is sunk to the High Main seam, thirty-five fathoms in depth. The present depth of the Augusta pit is seventy-three fathoms, being divided by wood brattice; four and a half feet of this is apportioned for the pumps. The large pumping-engine, designed to drain both Dinnington and Seaton Burn mines, is on the ground; the main-beam is constructed of wrought-iron, and will extend from the pumping section of the large shaft to a staple, seven feet in diameter, within the house, now nearly sunk to the High Main seam; in which the upper lift of pumps will be placed. The pump-rods will thus be attached to the extreme ends of the beam, with unequal stroke; the rods of the upper lift working close to the side of the steam cylinder. Great care has been taken to obtain good foundation for the massive stone pillars required for the cylinder and beam, the pillars are in course of erection, and are built of Ashlar stone blocks, set with cement. Water in large quantities is usually met with in working the Low Main seam in this district, and this engine is likely to have constant employment in pumping the water from both mines.

The permanent winding-engine for the Augusta pit has two thirty-inch horizontal cylinders, five-feet stroke, direct-acting; at present it pumps water in two lifts, by means of an eccentric, horizontal rod, and two quadrants. The lower lift is thirty-eight fathoms, twelve-inch bucket, three-feet stroke; it is suspended from a ground crab and rope on each side by five-fold blocks. The upper lift is from the High Main, thirty-five fathoms, eighteen-inch bucket, three-feet stroke. Five plain boilers, thirty by five feet, supply this and two other engines with steam at thirty-five pounds pressure. The boiler feeder has a seven-inch inverted cylinder, four-inch plunger. The pumping-engine, winding-engine and boilers were made at the Works of PALMER'S Shipbuilding and Iron Company. The sinking-engine for the large pit has a twelve-inch horizontal cylinder, two-feet stroke, wheels in ratio of one to four, one four-feet drum. The sinking-engine for the twelve-feet pit is one of CLAYTON and SHUTTLEWORTH'S portable class, six and a half inch cylinder, ten-inch stroke, wheels in ratio of one to eight and a half, one three-feet drum. The permanent winding-engine is being erected for this pit by BLACK, HAWTHORN & Co., of two twenty-inch horizontal cylinders, three feet four inches stroke, direct-acting, cylindrical drum, with two Cornish boilers. The other erections include large shear legs, and a crab-engine; this engine has one twelve-inch horizontal cylinder, two-feet stroke; it has three pairs of pinion and spur wheels, in ratio of one to four; the second pair is in connection with the jack-drum, giving increase of power sixteen to one; the third pair is in connection with the crab-drum, giving increase of power as sixty-four to one. The crab-rope is iron wire, five-inch circular, the back-rope is three inches.

Considerable quantities of water have been encountered in these sinkings, which have been partially damned back by tubbing; twenty-one fathoms of tubbing is inserted in two lengths below the High Main seam, and seventeen fathoms in each pit above it.

Killingworth railway runs from Killingworth colliery to the river Tyne, the shipping staiths being at Wallsend, four miles distant; junction is also effected by other railways from Gosforth and Seaton Burn Collieries. The company are thus enabled to send coals for shipment either to Wallsend or to the North-Eastern system for inland transport. Six locomotive engines and a large stock of chaldron wagons run on the Killingworth lines. One of the old Killingworth locomotive engines is still worked; this ancient "traveller," now called No. 1, has had its worn-out joints repaired by the best portion of the parts of another engine of the same type—the "Atlas"—now laid upon the shelf. These engines, now regarded as curiosities, have two vertical cylinders, ten and a half inches diameter, half inserted in the top of the boiler, piston-rod and cross-head above each. From the ends of each cross-head a pair of long connecting-rods reached down to the driving-wheels; they worked economically, but are too light for modern requirements; the last one remaining is only used occasionally.

Steam Boiler Explosions.

THE following is an abstract of the evidence of MR. LAVINGTON E. FLETCHER, Chief Engineer to Steam Users' Association, given before the English parliamentary committee on boiler explosions, taken from *The Engineer*. He had investigated the most important of the explosions since 1861. After speaking of six of the most fatal, involving the death of ninety-four people and the ascertained injury of eighty-four, witness stated that during the present year there had been twenty explosions, killing forty-four persons and injuring thirty-four. In 1869 there were fifty-eight explosions, killing eighty-six and injuring 126. From 1854 to 1869 there were 539 explosions, killing 909 and injuring 1081 persons. Including this year (1870), there had been 559 explosions, by which 953 persons were killed and 1114 injured—together, 2067. Many other explosions may have happened, of which no records have been obtained. Last year (1869), eighty-six were killed. In less than half this year (1870), forty-four have been killed. The persons killed every year by boiler explosions exceeded the number of passengers killed on all the railways in the United Kingdom. From 1865 to 1869, 112 passengers were killed by causes beyond their own control, and 336 were killed by boiler explosions, or three times as many.

The causes of explosions had been involved in unnecessary mystery. They happened from known laws, and from the pressure of steam within the boilers. Boilers burst because they are bad, either from neglect of the boiler-maker in turning out a bad boiler, or the boiler-master in letting it get into bad condition, or the boiler-minder in letting the water run short. Minders were often said to cause explosions, which proceed from the want of science in the maker or the greed of the master. Where the boiler-minder had to answer for one explosion the boiler-maker or the master had to answer for six. In the fifty-eight explosions last year twenty-six were from malconstruction; fifteen from bad condition; seven from shortness of water; one from use of composition; one from overheating, but doubtful; eight uncertain. From June, 1861, to June 17th, 1870, there were 441 explosions, killing 639 and injuring 782 persons. No details were made of many, but out of 297 cases 120 were from malconstruction of shells or fittings; eighty-eight from bad condition; forty-four seams bad over external fire; thirty short of water; six from incrustation; one from use of composition; one doubtful; five from excessive pressure and valves tampered with; one economiser, from either gas in the flues or over-pressure; one independent of boiler, and accidental. The most frequent source of malconstruction is the omission of hoops on furnace tubes in Cornish and Lancashire boilers. The Steam Users' Association had taken great pains to explain the use of these hoops, and to circulate the information broadcast. It was found in 1866 that out of 227 explosions forty-nine were of the Cornish class, or one in every four or five; yet when well made and carefully used it was the safest boiler, and never burst until it was abused.

Another form of malconstruction is the weak manhole, or merely a hole in the plate, without strengthening rings. This was often found in very small boilers, yet their explosion had caused many deaths. Another form of malconstruction is want of stays. The unwise practice of taking out tubes from Cornish and Lancashire boilers without inserting suitable stays was a frequent source of explosion. Malconstruction was sometimes due to bad material and workmanship; and again to the defective equipment of the boilers. A spring safety valve was shown from an exploded boiler in which a turn of a nut added 80 lbs. A similar valve had caused another explosion. With regard to defective condition, boilers were worked on until corroded to the thickness of paper; sometimes externally from damp flues, or internally from bad water. An example was described of a boiler twenty years old, and worked at 50 lbs., corroded along the bottom as thin as paper where it rested on the brickwork. It had never been inspected, as the flues were too narrow. Specimens of internal corrosion were shown from Aberaman, where two boilers exploded in 1864. The feed water was from coal workings, and very corrosive. Another specimen was shown from Bury, reduced from 7-16ths to 1-16th in two years. A very roughly made patch from an exploded boiler was shown with thirty-seven bolts and a plate on inside and out, filled in with hemp. This was to cover corrosion, and itself led to further corrosion from leaking. At the inquest the cause was attributed to the unskilfulness of the engineer in making the patch, but no blame was attached to him. A model and photographs were shown of a boiler which exploded at Chatham in 1866 from corrosion; much damage was done.

The best means of grappling with explosion was by competent inspection. Boilers should be inspected and tested before leaving the makers' yard, and also periodically, while they were both under steam and at rest. Every boiler should have an "entire" examination once a year, when it should be entered and the flues passed through. MR. FLETCHER stated that during the nine and a-half years he had been chief engineer to the Steam Users' Association, only one boiler approved by them had exploded, and that from the injudicious use of boiler composition, which was supposed to prevent incrustation. This was at the rate of one approved boiler in 10,000. Proper blowing-out had been neglected. The Steam Users' Association had five other explosions of boilers not approved by them, but under their inspection. One of these had an oval flue of very weak form, which it was ordered should be strengthened; but it burst while this was delayed. During the last five and a-half years the Steam Users' Association has endorsed its approval of boilers by guaranteeing £300 in case of explosion. While during the five and a-half years only one guaranteed boiler had exploded, 279 explosions had occurred, killing 380 persons and injuring 473, among these boilers outside the ranks. There are, perhaps, 100,000 boilers in the kingdom.

The great loss of life resulting from explosion points to the conclusion that coercion must be adopted, and that every boiler user should be compelled to have his boiler inspected. The system of inspection which MR. FLETCHER suggested was set forth in a document which he handed in to the committee, prefaced by the remark that the reference to the Board of Trade was not introduced willingly, but from necessity. The paper said: All boilers should be inspected and certified by a public authority, duly constituted for the purpose, with no other object in view than that of efficiently performing a public duty; it should therefore be enacted by Parliament that for a certain period no boiler should be used which is not certified. The authority for carrying out the inspection of boilers, and granting certificates, should be a board constituted by act of Parliament, to be called the Steam Boiler Commissioners, or by any other appropriate title. The first members would be nominated by the act, the board to be periodically recruited by new election, a portion of the board going out yearly, biennially, triennially, or at stated periods, as may be considered advisable. The principle of popular election should be adopted as the basis for electing members of this board; the electors would be the proprietors of certified boilers. Candidates for vacancies to the board should be nominated by the electors, and, when nominated, the Board of Trade should have a veto on the candidature. The election of candidates approved by the Board of Trade would be managed through the medium of voting-papers transmitted through the General Post-office. The Board of Trade should have the power of introducing *ex-officio* members to the board. The proceedings of the board to be conducted according to regulations approved by the Board of Trade, in a manner analogous to the course now adopted for many other public boards. The board would have the power to appoint all appropriate officers. The whole cost of administration to be defrayed out of inspection and certificate fees, paid by boiler proprietors. These fees to be fixed by the board, subject to approval by the Board of Trade. The aggregate of these fees would form a fee fund, from which all expenses would be defrayed; the fees to be, from time to time, fixed according to the exigencies of expenditure. If at any time the fee fund is in excess of authorized expenditure, the surplus to be appropriated under the direction of the Board of Trade, subject to the sanction of Parliament." "That just gives the leading principle of the board as proposed; of course there are many points of detail arising upon that scheme." Scotland was left out of the proposal at present, but might be added if the plan answered. This board should insist on an entire examination annually. A boiler might be objected to for partial defects, and have its certificate suspended, but after repair "certified" safe.

It is a mistaken idea to suppose that explosions arise so much from ignorance or neglect of those who attend to boilers. A well-appointed boiler can hardly be injured by any fault of the men. It was a total fallacy to suppose boiler insurance companies had a direct interest in preventing explosions. They tended to promote boiler explosions. The association has always avoided insurance principles. An insurance company had for its object a good dividend. If the total number of boilers in the kingdom were 100,000, and fifty explode each year, that is, one in 2000, and £100 could be assured for 1s., experience showed that inspection costs 1s. per annum; but insurance should only cost 1s. if it was left alone, and that would make sufficient fund to pay £100 in case of explosion. The insurance companies last year had 10,000 boilers under them, and made 5000 flue examinations, leaving 5000 unexamined for which they took the money. Several cases may be mentioned where insured boilers have exploded which have never been examined in the flues, and were in a dangerously corroded condition. The insurance companies paid regularly 10 per cent., and the shares were up to £300, £400 and £500 premium.

The Railway Problem in Massachusetts.

THE Report of the Board of Railroad Commissioners to the Legislature of Massachusetts, is a document which deserves, and will doubtless receive, a wide consideration and discussion. It will be especially interesting to the citizens of this State, treating as it does questions of the very highest importance to our material and moral welfare, with a directness and freedom to which we have long been unaccustomed in official documents. While our vast railway system has fallen by our own criminal apathy and the corruption of our judicial and legislative authorities, coupled with the weak connivance of the Executive, into one great engine of theft and fraud, there is something singularly refreshing in the sight of an organized board of officials in a neighboring State investigating with a fearless and impartial earnestness the horny problem of communications, and suggesting tentative improvements, which they frankly confess will fail, and in which no suspicion of jobbery or political manœuvre appears to be found.

The Report is divided into two parts—the first treating of

matters of a local or temporary character, and the other being devoted to the consideration of general questions of railroad development, arising out of the relations existing between the community and its railroad corporations. The first, though it contains many judicious and striking observations, has its principal applicability to the State of Massachusetts. There is, however, one noteworthy fact developed in it, by a comparison of statistics, which would seem to indicate that the expressive care taken in Europe to prevent accidents to travellers is not justified by results. The number of passengers killed or injured on British railways in a given year was one in 334,000; on the watchfully guarded Belgian railways, one in 1,600,000; while in Massachusetts, our American recklessness brought to grief only one in 2,000,000. It appears, on the whole, as if the people can take as good care of their own lives as the administration possibly can.

The second part of the Commissioner's Report confronts resolutely the question of the relations of railroads to the community and the law-making power. It adverts to the evident truth that the prosperity of Massachusetts is bound up in its manufacturing interests, and shows that the development of its industries is very largely dependent on the excellence of its communications. At the same time a tabular statement of the principal roads for the last ten years reveals the fact that the tariff of transportation, instead of being reduced, has been positively increased in that time. The reduction of this exhausting tax upon the manufacturing interests of the State is a matter to be striven for in every practicable way; but it is not reasonable to expect any such relief from the present systems of competition or of combination among private corporations. On the other hand, the advantages derived from the keen rivalry of contending lines in reducing through rates on routes leading out of the State are more than neutralized by the assumed necessity of recovering losses thus sustained by raising the tariff on local transportation.

This seems to the Board, and apparently with reason, a short-sighted and suicidal policy. It is not by raising, but by lowering tariffs, that the business and the prosperity of railroads is increased. Even if they should convey at a loss some articles of prime necessity in manufactures, the impetus thus given to the general activity would react favorably upon the roads. The Commissioners express their conviction that an immediate average reduction of 10 per cent. with an ultimate and not remote reduction of 30 per cent. could be made in the railroad tariffs of the State without permanently affecting the net earnings. Even if this should result in no great increase of profit to the roads, it is the right of the community to insist on the greatest utility of administration in return for chartered privileges. The question then arises, how is this necessary reduction of tariff to be best effected? The inefficacy of private competition and of combinations of corporations has been clearly demonstrated. The assumption by the State of the control of the roads, and the administration of them by Government officers, is so at variance with all our traditions and prejudices that it would not anywhere be looked upon with favor. The only measure that occurs to the Commissioners as being likely to lead to a solution of the difficulty is avowedly tentative and experimental. Let the State acquire control of one railroad, and carry it on, through trustees, the way that shall seem best calculated to subserve the public interests, leaving the private corporations free to complete within limits of the law. And upon the result of this experiment, fairly tried, let the future regimen of the railroad system of the State depend.

To prove the compatibility of private and public ownership of roads in the same country, they quote the statement of M. FASSIAUX, Belgian Director-General of Posts and Railways, who says that there were in January, 1864, 1247 miles of railway in Belgium, 347 miles of which had been constructed and were worked by the State, belonging to it without reserve; 117 were worked by and belonged to the State, but paid a portion of receipts to the companies which had constructed them; 780 miles were constructed and worked by private companies, free from public control. M. FASSIAUX says: "The State railways thus (through a mixed system of ownership) find themselves placed in constant comparison with the railways worked by private companies, on the one hand stimulating them to general improvements, and, on the other hand, acting as a sort of check against any attempt to realize extravagant profits at the cost of the public."

The road which is indicated as most favorable for this experiment is the Boston and Fitchburg. It lies wholly within the limits of the State, and occupies an advantageous position for competition. It can be acquired by the State, either by amicable negotiation or by the provisions of existing statute law providing for such contingencies.

This is, therefore, in a word, the plan of the Commissioners—to place side by side, each under the auspices most favorable to development, and subject to no laws but those of Massachusetts, the two systems of public and private management. Both will understand that they are on probation, and the system found most successful, after a reasonable term of years, will be adopted, to the exclusion of the other. The country at large, which is surveying with deep anxiety the growing evils of our present system, will await with interest the action of the Massachusetts Legislature upon this suggestion. If the plan should be adopted, and the experiment should succeed, the real question of moment would then come to the front. As most of the great lines extended through several States, and are therefore not subject entirely to the jurisdiction of any one, the principles developed by the Massachusetts trial would then claim the attention of Congress, with the view of applying them throughout the country. And we know of no question which would subject the wisdom and the purity of our legislators to such a strain.—*N. Y. Tribune.*

The European Coal and Metal Markets.

A RECENT number of the London *Mining Journal* contains the following article upon the influence of the war upon the European metal markets:

Cold weather has given a great stimulus to the demand for domestic qualities of coal at Belgium; but, on the other hand, it has singularly interfered with deliveries. These can only be made by railway; and, climatic obstacles apart, the supply of rolling stock is sadly deficient. Advices from the Belgian coal mining centres indicate a sustained demand on the part of Germany and Holland. The Belle-et-Bonne Colliery Company, at Jemmapes, is paying its dividend for the first half of 1870, or 12s. per share. The Charleroi United Collieries Company is paying a dividend of 10s. per share for 1870, and also half-yearly obligation interest. The Bonne Esperance and Batterie Colliery Company, at Liége, is paying a first dividend for 1870, of £1 per share.

Pig in Belgium is disposed of as readily as it is made, and there are scarcely any stocks. The rolling mills are generally less well off for work, no new orders of any importance being reported. The period of the year can scarcely be pronounced, however, a favorable one; it is the time of stock-taking, when affairs are generally in a languishing state. At present industrials have not very much to complain of, and they have profited from the absence of pressing orders, so as to prepare to profit from the revival in business which is expected to follow the cessation of hostilities. The Luxembourg question still disturbs forgemasters, who ask, "Is their security at all reliable? It is hoped, nevertheless, that Prussia will think twice before decreeing measures which will be prejudicial to local metallurgical industry. The Grivegnée Company has been authorised to add to its iron works ten puddling-furnaces, a pile hammer of 15-horse power, a horizontal steam engine of 20-horse power, and sundry other appliances.

Very little commercial information now comes to hand from France. It appears, however, that at the last dates Toka copper was quoted at Marseilles at £80 per ton; refined Chilian and Peruvian at £78 per ton; red copper in sheets at £80 per ton. In Germany, the number of transactions in copper continues comparatively limited; this must be attributed to the season of the year, and to the difficulty attending all transports. At Rotterdam, Russian has made 51 fls., and Drontheim 50 fls. to 52 fls. The German tin markets present a favorable appearance; at Berlin, the demand has been maintained, and transactions have been rather more numerous. At Rotterdam there have not been any very great transactions in tin; Banca is quoted at 76½ fls.; Billiton is scarce, and cannot be purchased below 96 fls. Advices from Batavia state that the quantity offered at the last bi-monthly sale of Billiton was about 6000 piculs. At Marseilles lead in saumons, first fusion, has made £18 16s.; ditto, second fusion, £17 8s.; and rolled and in pipes, £20 16s. per ton. On the German markets lead has experienced no change. At Rotterdam, Stolberg and Eschweiler have made 11 fls.; ditto, various German marks, 10¾ fls. Upon the German markets there is scarcely anything passing in zinc; stocks are considerable, and increasing.

It will be interesting to examine the financial position of Russia, as upon the course of Russian finance will probably depend the future prosecution of Russian railway enterprise—at any rate, of guaranteed Russian railway enterprise. It appears that, according to the estimates which have been prepared for 1871, the probable receipts of the Russian treasury for the year are set down at 475,093,437 roubles, and the probable outgoings are given at 491,782,589 roubles. The estimates show that the receipts are considered to be increasing. The probable augmentation of revenue in 1871 over 1870 is calculated at about 4,000,000 roubles, while the increase in the expenses will not, it is estimated, exceed 2,770,000 roubles. It is obvious, however, that all these conjectures and calculations will not count for much if Russia engages in any great conflict. That Russia is intensely military already will be seen by the fact that she proposes to expend 154,590,000 roubles for naval and military purposes. We have been at the pains to go into these details because Russia has supplied of late such a valuable contingent of orders for railway iron to the British iron trade.

The latest advices from Charleroi state that contracts for coal which have been entered into for the first six months of 1871 have been concluded upon the same footing as those made in September, 1870, which are now nearly run out.

The Belgians are rather proud, and justly so, that all the mechanical apparatus for the piercing of the Mont Cenis Tunnel has been furnished by the Company John Cockerill, of Seraing, in Belgium.

MINING SUMMARY.

California.

LEAD AND SILVER SMELTING IN SAN FRANCISCO.

"The extent to which the several leading branches of mining have already been developed on this coast," says the San Francisco *Bulletin*, "indicates the broad range of our metaliferous resources and the energy of our people, and is highly suggestive of the possibilities which the future may yet bring within our reach. Step by step has this industry advanced from the smallest beginning to its present stable and prosperous condition. Attacking first the placers with their readily appropriated wealth—then the veins of auriferous quartz, necessitating the employment of additional skill and capital, we find ourselves, at last, engaged in the still more formidable business of treating the rebellious ores. The invasion of this (to us) new province of mining has been attended by great difficulties and unexpected requirements, for the conditions of success have been not only novel to our experience, but inexorable and exacting. With practical skill and large capital must be united technical knowledge and judicious business administration; a lack of one or the other of these elements having worked disappointment or entire failure in nearly every attempt made at beneficiating this class of ores.

THE WORKS OF THOMAS H. SELBY AND COMPANY.

Are the largest, and, indeed, the only extensive and complete establishment on the coast for the management of what are termed rebellious ores. They were started by Mr. SELBY, our present Mayor, some four years ago, for the purpose of supplying lead of home production to his Shot Tower and Lead Pipe Factory, on the corner of First and Howard streets, in this city. The undertaking was, at the outset, projected on a very limited scale, the capacity of the works being restricted to the above requirements. The establishment contained but a single furnace, capable of treating not more perhaps than fifty or sixty tons per month. But the site and other advantages were selected with a view to enlargement when called for. Once inaugurated, the business grew beyond anticipation. From time to time additions to the works became necessary, and the establishment, keeping pace with the requirements, grew year by year, until it has attained its present vast proportions. It now outranks all similar ones in the United States.

THE SITE

Has been selected with good judgment, both in regard to sanitary considerations, and to a frugal and efficient accomplishment of the main objects. The location is at Black Point, in the northwestern portion of the city, directly at the edge of the Bay, and but a short distance inside of the entrance to the harbor. A commodious wharf enables vessels to receive and discharge cargo convenient to the furnaces.

PRESENT EXTENT AND CAPACITY.

Permeating every part of the works, and reaching to the end of the wharf, is a system of railways over which everything requiring carriage is transported. The ores, crude bullion, coal and other supplies are brought in, and the refined metals carried out to be stacked up on the wharf, or shipped on vessels waiting to receive them. Over these rails the ashes, slag and other recrementitious matters are also sent to be dumped outside, where they are made to serve a useful purpose in filling up the lot upon which the extensive additions is to be located. In fact, the whole of these works stand upon made ground, the waters of the Bay washing them on three sides. These railways, besides helping on the preparatory work, relieve the laborers of much severe toil that would otherwise be imposed upon them. An engine of — horse-power transmits the power used for driving the crushing-mill and the machine connected with the blast-furnaces. All included, there are now 26 furnaces doing active duty, two of these being blast, and one a double roasting furnace of large capacity.

IMPROVEMENTS CONTEMPLATED AND IN PROGRESS.

The wharf, in common with the whole establishment, is now undergoing extensive enlargement, and when completed will have a frontage of 400 feet, with a depth of 15 feet of water at its head. The projected enlargement of the works calls for a heavy outlay, and will, when completed, augment the working capacity sixty or eighty per cent. In addition to the furnaces now in operation there are to be six blast and three roasting furnaces. Ultimately there will be forty furnaces of different kinds, all built after the most modern and improved pattern. A corps of masons are now engaged in the erection of new structures. Some of these will be devoted to the purpose of smelting gold and silver bearing ores, which are now coming forward with much freedom; others will be added for the treatment of tin and copper ores when these present themselves in such quantities as to justify the measure. At one time the bullion and ores came in faster than they could be disposed of; but this cannot ever recur, as the furnace power will in any event be kept well in advance of ore receipts. The additional furnaces make the erection of another smoke stack necessary, the foundation for which is being excavated at a point some distance out in the bay by means of a large iron coffer-dam, which, enclosing the workmen, is made by heavy weights to sink as the excavation advances. When a material sufficiently solid is reached, the foundation consisting of massive masonry will be laid, and the superstruction proceeded with. This stack is to be ten feet square at the base, tapering to eight feet at the top, with a flue six feet in the clear, and will be carried to such a height as the draft after trial may seem to require.

LABOR FORCE EMPLOYED.

About one hundred hands are employed. The most of them have acquired their skill in this service. Good discipline and the most perfect order pervades the entire establishment, and dissatisfaction or complaint among the employees is almost wholly unknown. Aside from the force directly employed, a far greater number are indirectly dependent on these works for their sustenance, and a large number of subordinate industries are quickened by the aid remotely extended to them.

THE BULLION PRODUCT.

This at present aggregates over 500 tons per month, which quantity will be augmented fully sixty per cent. inside of two months. There will soon be facilities at command for handling 1,000 tons of crude bullion every month. With the exception of this establishment, the one at Newark, New Jersey, is the largest in the United States. But the business done here is already thrice as large as that done at Newark. The magnitude of the transactions here can be indicated by the statement that eight annealing furnaces are constantly employed in refining and parting lead bullion, the quantity of this operated upon averaging 250 tons per week.

THE PAST AND THE FUTURE.

At the commencement of operations, the management of the works labored under great disadvantage, in being obliged to pick up ore in driblets wherever it could be found, there being no steady, or at least large and certain sources of supply. A few tons at most constituted a respectable consignment. Now ores arrive by the car load and cargo, whole trains in fact arriving freighted with these precious staples. It is literally the case that the metals of various kinds are roughly estimated at these works by the cord, the quantities which sometimes accumulate being so enormous as to justify this method of computation. And yet, looking at the intensity of this class of ores within easy reach, the conviction is forced upon us that this industry is yet in its infancy. When railroads are built, as they soon will be, connecting San Francisco with the more distant and prolific mining fields, we may expect to witness such an expansion of this pursuit as will multiply its importance many fold. Already, with but one such channel of communication extending into the distant interior, the ore receipts of the past year have aggregated some 14,000 or 15,000 tons, being more than double the receipts of the preceding year. About 80 or 90 per cent. of these receipts find their way to the works we have been describing. From the small mining camp of Cerro Gordo, Inyo county, over 200,000 pounds of lead bullion, fertile in silver, have come to this port during the past year, the most of

which was under consignment to these works. The Eureka Consolidated Company, of Nevada, have of late run from their furnaces 20,000 pounds per day of a similar product, though richer in silver. The bulk of this has had the same destination. A few days since 60,000 pounds, comprising three car loads, of bullion arrived here from the works of that company, having been personally contracted for by Mr. Selby. These parties have made trials at Newark and elsewhere, but find that they can receive closer returns here. The Eureka Company's bullion has yielded here $380 per ton. The managers of various other mining interests in Utah and Nevada have of late become, and still are becoming, convinced that they can best subserve their own advantages by consigning their ores to San Francisco. It is proper to state in this connection that the proprietors of the Selby works are the owners of the exclusive right to use a certain metallurgical process, which they think enables them to perform their work at considerable reduction in expense. Numerous other facts might be adduced to show that

SAN FRANCISCO IS THE NATURAL ENTREPOT

of this class of ores for all parts of the Pacific Slope. Her geographical position rendering her the focus of the entire railroad system of the coast, as well as the ocean steamship lines through which China and Japan are to receive their supplies of bullion—the greater cheapness here of subsistence and all material for the reduction of ores—the incomparable excellence of her climate, enabling workmen to perform their labors with more health and comfort than elsewhere—the concentration in this city of greater skill, intelligence and capital, and, finally, overlooking many secondary advantages, the establishment already of smelting works, which it is believed are second in every desirable attribute to none in the world, constitute some of the prominent reasons why San Francisco may be expected to draw the bulk of this class of ores for treatment. It is a peculiarity of many of our richest mining districts that they are deficient in the prime staples of fuel and water, and are necessitated to send their smelting ores away for reduction. For the entire region west of the Sierra, and reaching southeast to Mexico as well as the entire northern coast, this city is the natural entrepot, while the lower freights and incidental charges, lessened loss and quicker as well as larger returns, have already determined that we shall be able to command the bulk of shipments from points as far east as Salt Lake, and, by inference, of all intermediate and adjacent points. The miner should remember in shipping ores hither, that those of a tolerably high grade are the most advantageous to all concerned, and should assort them accordingly. Yet every facility is here afforded for having ores stamped and their exact value ascertained before they are disposed of, and this with the greatest expedition and at very trifling cost. The reputation of the proprietors of these works is so well established that the owners of rebellious ores can rely on receiving liberal treatment and large and speedy returns. The proprietors are ready to advance freight charges on all fair grade ores consigned to them, looking to final returns for reimbursement.

THE VALUE OF THIS TRADE

can hardly be exaggerated, as the trade of every community is forced by the obvious laws of commerce to follow their leading commodities to a market. If the ores and metals come here for treatment and a market, then, also, will the miners come for their machinery, the merchants for their goods, and the great bulk of the business of those distant localities will follow. It is to the establishment of such manufacturing industries that the Pacific coast must look for her future prosperity. The San Francisco shot-tower and lead-pipe manufactory on the corner of Howard and First streets, owned by the same firm, make all the shot and lead pipe required on this coast, and has an annual surplus of some 3,000 tons for shipment to New York. The prospect is that in a few years it will supply a very considerable export demand.

A ROTARY STAMP-MILL.

The Central City *Register* has the following account of a rotary stamp-mill now being put into operation in Nevada, on the American Flag lode: "This is the first rotary-mill ever brought into this county, and the only one of the kind we have ever seen. It appears to have been the design of the inventor to secure the grinding motion of the pan with the ordinary stroke of a stamp. The battery is circular, having a screen-surface of twenty-one feet in length by fifteen or eighteen inches in depth. The bottom of the battery is divided into seven inclines, with as many offsets. The stamps are ten in number, and are set between rollers or shieves strongly fastened to a cylinder. The stamps do not work perpendicularly, but are inclined backward at the top. The revolution of the cylinder carries all the stamps around in the battery, raising them to the top of the inclines or steps, grinding the ore as they go. The stems are guided between the shieves before mentioned. When a stamp is raised to the top of the incline, it falls about ten inches into the bottom of the next incline. Springs are to be used also, to give a quicker and heavier drop. The cylinder is run at a speed of twenty-five revolutions per minute, and may be run as high as thirty-three. Each stamp, dropping seven times to each revolution, gives seventy drops to a revolution, showing that at twenty-five revolutions per minute there are 1,750 drops per minute to the mill. As a matter of course it must crush ore rapidly. The mill is not in steady operation yet, but the detention is due to the ordinary difficulties of getting new machinery into good working order. MR. RICHARDSON, who is superintending the operation, says it is no experiment, that he knows how much it will crush, how much power, etc.; but as al representations in regard to new machines are usually thought extravagant, he proposes to say nothing, and let the operation of this new mill speak for itself. We shall endeavor to keep our readers informed as to its success."

Nevada.

HUMBOLDT.

The *Silver State*, Jan. 21st, says: "The season has been one of unusual drought so far, and some apprehension is beginning to be felt concerning the water supply for next summer. The mountain streams are lower now than ever before known since the settlement of the country by the whites, and there is hardly any snow on the mountains, which constitutes the summer supply. The Arizona Company, a short time ago, ordered a car-load of stone-coal from Wyoming Territory, to make a trial of its value as a substitute for wood in generating steam in the mills of the company. The test, it seems, was hardly satisfactory, and two more cart-loads have been ordered for a farther experiment. Should coal prove more economical than wood, it will haste the construction of Colonel EVANS' narrow-gauge road to Mill City. The Butte mill, after an eight days' run from their mine, shut down on Wednesday for the want of water to keep up steam. The supply was obtained from a small mountain stream, which, owing to the severity of the weather, ceased to afford the necessary quantity for the purpose of the mill."

Arizona.

GOVERNOR SAFFORD ON THE MINES.

The annual message of Gov. SAFFORD to the Legislative Assembly contains the following remarks in regard to the mining interests of Arizona:—"During the past year, several new and valuable discoveries have been made. Among them are the Burro mines near the eastern boundary of the Territory. I visited this locality in May last, and from the surface indications, there appears to be one of the most extensive and probably one of the richest mineral deposits yet discovered. There is a great scarcity of wood and water near the mines, but money, skill and energy can overcome these difficulties. Another very rich discovery of gold quartz has been made in the Bradshaw mountains, between Prescott and Wickeburg. I have seen a large variety of samples of this ore, and can testify to its value. Considerable quantities of it have been reduced in a crude way by the arastra process, and it yielded from $100 to $300 per ton. A small mill is now in process of erection at the mines, and I confidently expect to see this district take early and front rank among the best paying in the country. Extensive deposits of gold ore have been discovered in Date Creek. Tests by the arastra process have been satisfactory and encouraging. A mill has been in operation at Big Bug, on a mining property of that name during the past year, and this enterprise has been highly satisfactory to the owners and of great advantage to the country. The Vulture mine and mill at Wickeburg are worked with regularity and profit. The mill contains forty stamps, and is constantly kept in operation with ore from the mine fifteen miles distant. I have visited this mine several times, and regard it one of the richest and most extensive known. Much placer mining is carried on in the vicinity of Prescott with remunerative results, and I consider it a very inviting field for placer mining. Most of the hills adjacent to the Colorado River are threaded with gold, silver and copper veins, a number of which are now being operated profitably, and with the assistance of capital, would doubtless be extensively developed. There are many mines in Southern Arizona that were operated with profit by the crude Mexican mode of mining, long before the acquisition of the Territory. After the acquisition, considerable capital was sent here for mining investment with fair prospect of liberal returns; but the anarchy incident to our civil war, which prevailed for several years, caused the destruction or abandonment of nearly all mining interests in this portion of our Territory. The proprietors of a mine situated a few miles south of Tucson, known as the Lee & Scott mine, recently freighted several tons of second-class ore to San Francisco and received a handsome profit thereon, after defraying all expenses. I believe there are many mines now untouched in this portion of the Territory that can be worked at a profit with capital and judicious management."

COAL.

"No discovery has been made during the past year of greater importance to our material interest, than that of an extensive vein of most excellent coal in the White Mountains near Camp Thomas. It has been used by mechanics at Camp Thomas and Tucson, and is pronounced by them a superior article. This discovery gives promise that an abundance of coal will be found in Arizona, and that the operation of railroads and the economical propelling of machinery will not suffer in consequence of a want of this desirable article."

MINING LEGISLATION.

"I am generally opposed to legislating upon mining questions, believing the miners of the several districts are better qualified to frame laws for th ir own peculiar wants and localities than the Legislature of the Territory, and they have almost universally prescribed their laws since the early discovery of gold in California, and Congress and the courts have recognized the wisdom of their action. It would be of vast assistance to the mining interests of the Territory to have an Assayer appointed by the Government to assay gold and silver bullion, and also make reliable tests of ore. We have many prospectors too poor to pay the expense of making such tests. They are a class of people who contribute as much to enrich the world and as little to enrich themselves as any we have, and I think it but right, after they have endured hardships and braved dangers to make discoveries, that the Government should aid them to the extent of furnishing them free of cost reliable information of what they have found; besides, we are now obliged to ship our ores for assay to San Francisco or Philadelphia, with no express facilities, and if returns are ever obtained, it is after a delay of many weeks or months."

Idaho.

THE MINES IN THE NORTH—A FIELD FOR PROSPECTORS.

A great many miners are coming to the conclusion, says the Idaho *Statesman*, that there is no better field for prospecting than upon the waters of Salmon River, between Boise Basin and the Lemhi Country. There is a section of mountain country lying in there, some two hundred miles square, which is, up to the present time virtually unprospected. A few places, with long intervals between, have already been found; among which may be mentioned: Deadwood Basin, Stanley Basin, Robinson Bar and Loon Creek. From Loon Creek to Lemhi Basin diggings is about one hundred miles. This stretch of country, up to the time of the discovery of Loon Creek, was almost a *terra incognita*. It is pierced by innumerable streams, bearing favorable indications of gold. The rugged nature of the mountains in this section, and the dangers of high water throughout the early spring and summer, have heretofore deterred the prospector from venturing far into these mountains. But the building up of settlements in the places we have named, will facilitate prospecting by enabling parties to replenish their supplies on short notice. One locality in particular was beginning last fall to attract considerable attention, and we know of several parties having gone in there with winter supplies, to camp and prospect all winter. We refer to the bars on Salmon River, for about twenty miles below Robinson's Bar. Good prospects had already been obtained there, and some ditch enterprise commenced. We venture the prediction that we shall hear of some new and important discoveries, as soon as parties get out from there in the spring. Other parties are also putting in the winter in that region prospecting. Some are on the Middle Fork of the Salmon, and others that we know of, are in what is known as the Yellow Jacket country. So far as we are able to judge at present, we do not know of a better place to which to advise those to go, who are desirous of taking their chances in the mines for a year or two, than this. There will be employment for many at good wages, while the water lasts, in Deadwood Basin and Stanley Basin, and later at Loon Creek and on Salmon River. If a good country to prospect in is the object, there is any amount in which perseverance has an excellent chance to be rewarded. And it would be well for our transient citizens to make some inquiry into the facts in relation to this section, before stampeding away to the new silver mines, where, if they are good at all, a poor man stands about one show in ten thousand to make any more than a good living.

Utah.

THE SILVER MINES.

Capt. WILLIAM LIGHT, characterized by the Colorado *Miner* as a person of large experience and a citizen of Georgetown, not long since visited the Territory of Utah for the purpose of examining the silver mines of Mormondom. Since the return of Capt. LIGHT, he has furnished the following interesting particulars: On Horn Silver mountain, East cañon district, fifty-five miles west of Salt Lake City, are the Tampico and other lodes. The vein material of the lodes is quartzite, calc-spar and chlorides. The country rock is limestone. Small pockets of very rich ore are found in the Tampico, the dressed ore yielding as high as $5000 coin, per ton. The second grade is worth $600, and the third grade $200 per ton. The lodes on Base Metal mountain, lying contiguous to Horn Silver mountain, contain argentiferous galena and carbonates of lead, containing about 50 per cent. lead and $50 per ton silver. Bingham district is situated about twenty-five miles west of Salt Lake City. In Bingham gulch sluicing for gold is carried on with good results. The gold is coarse in size and of fine quality. There are several gold lodes here upon which a large amount of mining has been done. In this district a California company is putting up large smelting works. The silver mines here are large and the pay vein material principally argentiferous galena containing about $40 per ton in silver and 50 per cent. lead. The country rock is conglomerate, porphery and trap. Capt. LIGHT speaks of Little Cottonwood, which is twenty-five miles south-west of Salt Lake City, in terms of high praise. It is in this district that the famous Emma Lode is situated. The country rock is limestone and the veins seem to be quite permanent. The ores of the Emma, and of the district, are galena and carbonates of lead, and carry about $200 per ton in silver and from 40 to 50 per cent. of lead. There is a good farming country in the district, and but for one mile around the Emma has been prospected. The ores from this district are hauled to Salt Lake City, where they are crushed, sampled and sold. Mountain Meadow is another district in Utah that seems to be flourishing. RAYMOND & Co. erected a mill there in 1870 and commenced working in Sept., 1870. Their mill contains 15 stamps and the ore treated is chlorides. The first month's run of the mill yielded over $35,000. Since which time the weekly shipments of bullion from this mill are from $15,000 to $20,000; these figures are reliable, being obtained from the books of WARREN HUSSEY, Banker at Salt Lake City. We have no doubt but that deposits of galena and carbonate of lead, similar to those found in Utah, exist in the south-western part of our territory, and we suggest to our prospectors the advisability of looking them up, especially as the large beds of fine coal, which we know exist west of the range, would be most admirable fuel for the cheap and rapid treatment of such ores.

Colorado.

MINING IN NEVADA.

The Central City *Herald*, January 7, says: "The mines of Nevada continue to yield large quantities of "auriferous" material and are generally paying a fair profit to the owners or lessees. Between forty and fifty claims are now worked on Quartz Hill. The Kansas lode is taking rank among the first of rich-producing lodes. Ten claims are worked on this lode, where a short time since all but two were idle. Several of these are yielding ore which yields from $120 to $180 per cord. On the California, STALKER COLLINS & Co. and JOE HARPER are meeting with good success. The two former claims are producing very rich quartz. BRADLEY and CREE, and HOPPE & Co. are doing well on the Kent County lode. CHARLES S. JONES is obtaining rich-looking ore from his new discovery below the California. HAGAR & Co. are still working their lode between the Forks and the American Flag, with good prospects, and BIRD & Co. ditto on the same lode, further west. WATERMAN has let his Camp Grove claims on contract. Four claims are yielding fair pay on the Burroughs lode. SABIN & JONES are each taking ore from the Forks lode. POWELL & WEEKS have leased WHITCOMB'S claim on the Indiana, from which they are raising quartz. WATERMAN has a large quantity of very rich ore on the dump at the Flack mine. This is paying handsomely. The Rhoderic Dhu, as usual, is yielding immense quantities of rich ore, keeping some seventy stamps in operation the greater part of the time. Among other lodes now being worked are the Platte County, GARRETSON'S, on the Sullivan lode, and others. On the Prize Hill, three claims are being worked on the Jones lode, by ANDREWS & Co., CAPTAIN PHILLIPS and MCGONIGLE & Co.; three on the Sudeburg, two on the Prize, one on the Crickbaum, and one on the Slaughter House. BUCK & Co. are obtaining plenty of rich-paying quartz from the Commonwealth claim on the Prize. JENNINGS & Co. are hoisting ore from a drift on the Central Company's claim—same lead. Work is again resumed in the Slaughter House lead, by LANGUS & MILLS, who are putting up a substantial whim-house, 30×44, and are about to let a contract for sinking 100 feet. This lead has yielded very rich pay. THOMAS JOHNSON is working BLODGETT'S claim on the Crickbaum. On Quartz Hill, the Golden Chariot lode is worked by HENRY BOLTHOFF & Co., with good indications of profit. They have just penetrated fifty feet of cap, and now, at a depth of seventy feet, have ten inches of pay-ore, which is steadily widening and improving in value as work progresses. C. HAGAR has struck "big pay" in his lode—the Monitor—and is taking out quartz which yields ten ounces of gold to the cord in the steam mill. The old Rochester Mining Co.'s claims, which have not been worked for four years, and never have, prior to this time, paid for working, are now leased by Cornishmen, who are taking out seven-ounce ore.

Pennsylvania.

A PENNSYLVANIA SILVER MINE.

Quite an excitement was created in Tionesta, Pa., last week, by the reported discovery of a silver mine, near that place. Search was made by a few citizens, but as yet they have failed to find it. The discoverer of the mine will not reveal the secret, he says, unless he is assured of a handsome sum of money. Under existing circumstances but little credit can be placed in the report, although it has long been supposed that silver has existed to some extent in that region.

THE NEW MINING LAW.

The Harrisburg *Telegraph* says: "We learned at Wilkesbarre that the enforcement of the New Mining Law by the inspectors in the Wyoming basin, has created a good deal of dissatisfaction among the men as well as the individual coal operators. The men complain because they are thrown out of employment, and the operators complain of permitting only twenty men to work, while the improvements contemplated by the mining law are progressing. The larger companies seem to care very little about the law. They say that they will carry out its requirements, when directed to do so by the inspectors, but they will not run their collieries to disadvantage with only a few men, but will stop them to make the improvements, and only employ the men required to do so until they are completed. They say they can stand as long as the men can."

MARKET REVIEW.

The Coal Trade.

NEW YORK, Feb. 10, 1871.

WHOLESALE.—There has been little more stir in the trade during the past week, at about the same quotations made last week. Lump, Grate and Egg, $7 to $7 75 alongside. Stove, $8 to $8 50 alongside. All eyes are turned toward the action of the Committee of the Transportation Companies and large companies, which we noticed last week as having held one meeting. They have held two meetings again this week, yesterday and to-day. They have as yet come to no definite conclusions as to the position they will take; but have adjourned until Tuesday next, in hopes of learning in the meantime of the proceedings of the Miners' Association, which is to be made public on Saturday. We are very glad to learn that the warlike position we stated last week that this Committee had assumed, was an error. They now claim that if any reasonable proposition is forthcoming from the Miners' Association, they will raise no barrier to the immediate resuming of work. Yet our readers must not consider the trouble is all over. There are plenty of chances for many difficulties to arise before this complicated question is settled; and upon the length of time occupied in its settlement depends greatly the value of coal. There is little or no coal coming to market now. A few stray lots, which had been piled up at various points on the line, is being sold, some of it coming through tide-water.

There are no new developments from the region in relation to the strike. All is quiet, and as yet we hear of very little growling on the part of any one, except it may be the storekeepers, who miss the weekly distribution of money among their customers, and now have to trust them. In the Schuylkill district there is probably more suffering for the necessaries of life among the miners than anywhere else, their rate of wages during the past six months not having been as remunerative as in other regions; here they have not been able to lay by a mite for a rainy day

Those of our readers who are in want of coal had better buy now at the figures quoted. Certainly the retail price cannot go below the wholesale rate for months to come, and a dealer had better keep his trade intact, even if he makes no profit on his sales. The large companies are yet selling coal at from $5 50 for Chestnut to $7 50 for Stove, but their stock is rapidly running out, and they are not receiving any fresh supplies. They will soon be entirely out of the market, and the great bugbear to the retail trade in this city will be removed for a time, at least.

Anthracite Coal Trade for 1870 and 1871.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending Feb. 5, 1870.

COMPANIES.	1870. WEEK.	1870. TOTAL.	1871. WEEK.	1871. TOTAL.
*Phila & Reading R.R.	38,431	385.277	5,914	523.227
†Schuylkill Canal	...	34 373	...	36.225
Lehigh Valley R R.	41,038	437,820	1,593	333,565
Lehigh & Sus. R.R.	735	86.378	17,2.8	55,529
†Lehigh Canal	....	....	....	.....
Scranton North	4.369	69,241	....	.....
" South	82.57	157,098	....	.....
Penn. Coal Co., rail	20.150	188,895	52	2,691
" " canal	....	....	....	....
Del. & Hud. Canal Co.. East	12.968	58 967	9,247	45,831
" " West	677	10.323	2,481	12,586
South	4,576	12,113	....	....
Shamokin	5,614	26,231	4,185	29,191
Trevorton	187	1,668	....	....
Lykens Valley Coal Co.	....	...	1,179	7,886
Wyoming South	....	....	....	....
Wyoming North	....	....	....	....
P. N. Y. C. & R. R. Co.	5,600	37,681	....	....
Williamstown, Coal'y	1,277	14,069	....	....
Big Lick Col	....	....	1,997	8,879
Total	217,582	1,413 154	43,916	1,054,910
1870	43.916	1,054.910		
Increase week and year	173,936	358,244		

* Less coal transported for Company's use and Bituminous coal.
†Closed for the season.

Bituminous Coal Trade, 1870 and 1871.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Feb. 4, 1871, compared with week ending Feb. 5, 1870.

COMPANIES.	1870. Week.	1870. Year.	1871. Week.	1871. Year.
B. & O. R. R.	....	4,635	12,127	69,874
C. & O. Canal	....	....	....	....
H & B. T. R. R.	6.292	30.977	....	11,700
Harrisburg & D.	3,486	53,174	6,903	38,728
L. V. R. R.	....	2,559	....	2,639
P. & N.Y. C. & R. Co.	3,063	31,389	....	30.084
Increase				

Shipments of Cumberland Coal

for the week ending Saturday, January 28, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M.	275 01	.....	.....
Borden	1:8 11	.....	.....
Consolidation	1,036 06	.....	.....
Spruce Hill	1,255 13	.....	.....
Midlothian	56' 08	.....	.....
H. and Baltimore	152 00	.....	.....
do Va M	648 02	.....	.....
V C & I Co	992 05	.....	.....
G. C. C. and I.	722 08	.....	.....
Maryland	....	.....	.....
American	....	.....	.....
Atlantic	1,188 11	.....	.....
Piedmont	1,544 00	.....	.....
Swanton	629 00	.....	.....
Barton	....	.....	.....
Potomac	1,000 10	.....	.....
Franklin	749 09	.....	.....
George's Creek M. C..	....	.....	.....
Big Vein	1,245 18	.....	.....
Total week	12,127 17	.....	12,127 17
Previous	57,746 12	.....	57,746 12
Total year	69,874 09	.....	69,874 09

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending February 4, 1871—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1871. tons cwt.	WEEK 1870. tons cwt.	YEAR, 1871 tons cwt.	YEAR 1870. tons cwt.
Wyoming Region	342 06	12383 05	38118 11	71042 08
Upper Lehigh Region		690 13	4814 06	3248 12
Mahanoy Region				
Hazleton Region		21 17	704 05	440 11
Beaver Meadow Region				
Tresckow Region			1043 03	
Mauch Chunk Region	408 08	5012 03	14774 08	25279 14
Totals	750 14	18107 18	59253 13	100011 05
Increase				
Decrease	17357 04		47757 12	
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	735 17	17268 15	55829 19	86378 09
Forwarded East of Mch Chunk by Canal				
Delivered at and above Mauch Chunk	14 17	834 04	3423 14	3007 14
Delivered to L. & B. R. R.at Plymouth Bridge		4 19		672 19
L. V. R. R. at Sugar N.				
Totals	750 14	18107 18	59253 13	100011 05
Of the above there was transported on acc'nt of L. C. & N. Co.	408 08	5012 03	16009 15	28789 01
W.-B. C. & L. Co.	272 00	4032 12	30790 03	30817 14
Totals	680 08	9044 15	46789 18	59606 13
Increase				
Decrease	8414 07		12906 15	

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending February 4, 1871, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt
Total Wyoming	1,000 01	65.243 17
" Hazleton	105 14	205,141 00
" Upper Lehigh		442 06
" Beaver Meadow		65.6.5 15
" Mahanoy	906 08	52,709 06
" Mauch Chunk		963 04
Total Anthracite	2,012 03	390,132 08
Bituminous Coal from all sources		2,639 00
Total by rail and canal	2,012 03	392,771 08
Same time last year	47,931 13	491,804 00
Increase		
Decrease	45,919 10	99,032 12
Forwarded East from M'h Chunk by rail	1,593 07	333,565 09
Same time last year	41,038 16	437,820 13
Increase		
Decrease	39,445 09	104,255 04

RECAPITULATION.

Forwarded East from M'h Chunk by rail	1,593 07	333,565 09
To N. C. R. R., at Mount Carmel		18 00
Forwarded North from L. & B. Junction	265 00	32,507 09
To L. & S. R. R. at Packerton for rail		1,837 02
Delivered at M'h Chunk		311 16
Delivered on line of road above Mauch Chunk		2,584 08
Delivered above M. Chunk for use of L. V. R. R.	153 16	9,721 13
To L. & S. R. R., at P'n Har., for railroad		94 10
Do. for canal		7,069 19
At M. Chunk for canal		2,431 02
Total Anthracite	2,012 03	390,132 08
Bituminous Coal		2,639 00
Total all kinds	2,012 03	392,771 08

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railroad, Saturday, Feb. 4 1871;

From St Clair	
" Port Carbon	400 13
" Pottsville	
" Schuylkill Haven	351 10
" Auburn	1,585 13
" Port Clinton	3,576 17
" Allentown and Alburtis	
" Harrisburg and Dauphin	6,903 00
Total paying freight	12,817 13
Coal for Company's use	1,548 04
Total for week	14 365 17
Previously this year	474,884 17
Total	489.250 14
To same time last year	476,131 09

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, February 4, 1871.

	Total for Week.	Corresponding week last Year.	Increase.
Passing over Main Line and Leb. Val Branch	5,573 17	38,435 10	
For Shipment by Canal	—	—	
Shipped West ward via Northern Central R. R.	1.390 11	3,558 07	
Shipped West or South from Pine Grove	577 09	270 00	307 09
Consumed on Laterals	1,101 09	3,413 02	
Lehigh and Wyoming Coal	148 13	120 18	27 15
Total Anthracite paying fr'gt	8,781 19	45.797 17	
Bituminous	6,411 15	3,841 07	2,570 08
Total of all kinds paying fr'gt	15,193 14	49,639 04	
Coal for Company's use	1,548 04	3,483 02	
Total Tonnage for Week	16 741 18	53,1 2 06	
Since Dec. 1, 1870	574,6.3 15	513,552 10	60,671 05
Total to date	591,365 13	567.074 16	24,290 17

SHIPPED BY CANAL.

	Total for Week.	Corresponding week last Year.	Increase.
From Schuylkill Haven	—	—	—
" Port Clinton	—	—	—
Total Tonnage per Week	—	—	—
Since Dec. 1, 1870	—	—	—
Total to date	36.225 17	34,373 16	1,852 01

Delaware and Hudson Canal Company.

The following is a statement of Coal transported by the Delaware and Hudson Canal Co., for the week ending February 4, 1871.

	WEEK.	SEASON.
By Del. and Hud. Canal,		
By Railroad East,	9,247 00	45,831 00
" West	2,481 00	12,586 00
" South		
TOTAL TONS.	11,728 00	58,417 00
For the same period last year.		
By Del. and Hud. Canal,		
By Railroad East,	12,968 00	56,967 00
" West	677 00	10,323 00
" South,	4,376 00	13,113 00
TOTAL TONS,	17,921 00	80,403 00

Pennsylvania Coal Company,

Shipments of Pittston Coal for the week ending February 4, 1871.

	1871. WEEK.	1871. YEAR.	1870. WEEK.	1870. YEAR.
By Railway	52 08	2,691 09	20,150 05	88,895 07
" Canal	— —	— —	— —	— —
Total	52 08	2,691 09	20,150 05	88,895 07
Decrease	86,203 18 tons.			

Company Coals.

February, 1871.
No quotations during strike.

	L.	Str.	Gra.	Eg.	Sto.	Ches
Scranton at E. Port	—	—	—	—	—	—
Pittston at Weehawken	—	—	—	—	—	—
Lackawana at do	—	—	—	—	—	—
Wilk'b're at Hoboken	—	—	—	—	—	—
Old Co. Lehigh at Pt. Johnston	—	—	—	—	—	—
Lehigh at E. Port	—	—	—	—	—	—

For freights to different points, see "Freights."

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK. February 4. R. A.	W. A.	AT PHILADELPHIA. February 3. R. A.	W. A.
SCHUYLKILL.				
Lump	$— —	$— —	— —	— —
Steamer	— —	— —	— —	— —
Broken	— —	— —	— —	— to —
Egg	— to —	— to —	— —	— to —
Stove	— to —	— —	— —	— to —
Chestnut	— to —	— —	— —	— to —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	— —	— —	— —	— —
Broken	— —	— —	— —	— —
Egg	— —	— —	— —	— —
Stove	— —	— —	— —	— —
Chestnut	— —	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A. 8 00		— —	— —
New England	—		— —	— —
Locust Dale	W. A. 7 50		— —	— —
Honey Brook, Leh	W. A. 7 50 to 8 50		— —	— —
Spring Mountain	" 7 50 to 8 50		— —	— —
Sugar Creek	" " 7 50 to 8 50		— —	— —
Sugar Loaf	" " 7 50 to 8 50		— —	— —
Old Comp'y's	" " 7 50 to 8 50		— —	— —
Cross Creek	" " 7 50 to 8 50		— —	— —
Room Run	" " — —		— —	— —
Girardville	" " — —		— —	4 75
McMichael	" " — —		— —	4 75
Shamokin	" " 7 50		5 25	— —
Lykens Valley	" " — —		5 75	— —
Broad Top	" " 7 50		— —	— —
Hill & Harris	" " — —		4 75	— —
Henry Clay	" " — —		5 00	— —
Powelton	" " 7 50		— —	4 75

*Dealers in these coals may be found in our advertising columns.]

Prices for Coal at Mauch Chunk.

February 1871.
BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein f.o.b. at Phila		$5 00
Lemon " " "		4 75
Cumberland Vein Coal		4 75
Consolidation Coal Co.'s on board	N. Y.	7 00
Maryland Coal Co. "	"	7 00

Prices at Baltimore—February, 1871.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 80@— —
Pittston and Plymouth, do	5 60@5 75
Shamokin Red or White Ash, do	— —@6 00
Lykens Valley Red Ash, do	5 25@— —
Zerba Valley	5 25@— —
Treverton	6 00@— —
By retail, all kinds per ton of 2240 lbs	7 25@8 25
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 60@4 75
Fairmont and Clarksburg gas, f. o. b. at L. Point	6 00@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

February, 1871.

George's Creek and Cumberland f. o. b. for shipping $4 40

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@5 50
Lykens Valley	— —@6 25
Shamokin Red or White Ash	— —@5 75
Trevorton and Zerba Valley	— —@6 00

Prices of Gas Coals.

February, 1871.

Corrected weekly by Louis J. Belloni, Jr. 41-43 Pine st., N.Y.

	Duty, $1 25, gold. Coarse.	Slack.
Block House	$1 75 @— 75	
Gowrie	1 75 @— 75	

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@— 80
Lingan	1 75	@— 80
Little Glace Bay	1 75	@1 00
Caledonia	1 60	@— 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Currency.
Westmoreland	7 75 @8 00
Fairmount Gas Coal Co. of N. Y.	7 50 @— —
Despard Coal Co	$7 50 @— —
Penn	7 75 @8 00
Newburg Orrel Gas	— — @— —
West Fairmount Gs Coal	8 00 @— —

AT PHILADELPHIA.

Powelton	$7 80

Prices of Foreign Coals.

February, 1871.

Duty $1 25 per ton.
Corrected weekly by PARMELE BROS., No 32 Pine street New York.

Liverpool Gas Caking	$ 9 00@— —
" " Cannel	11 50@12 50
" House "	— —@16 00
" " Orrel	12 00@14 00
Per ton 2,240 lbs., ex-ship.	
PRICES FROM YARD.	
Liverpool House Orrel, screened	$16 00@17 50
" " Cannel, "	18 00@20 00
Per ton 2,000 lbs. delivered.	

Foreign and Provincial Freights.

February, 1871.

Closed for the winter.

Foreign.		
Newcastle and Ports on Tyne, per kesl of 21 1-5 tons	£14 00@£16 00	
Liverpool, 5 per cent primage	13s	@16. ton
TO NEW YORK.		
Provincial		
Sidney	$ —	
Lingan	—	
Cow Bay	—	
Port Caledonia	—	
Little Glace Bay	—	
TO BOSTON.		
Sydney	$ —	
Lingan	—	
Cow Bay	—	
Port Caledonia	—	
Little Glace Bay	—	

Rates of Transportation to Tide Water.

Closed for the Season.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon	$2 00
Less drawback of 50 cents on all Coal shipped east of New Brunswick and south of Cape Henry.	

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 84
C. R. R., N. J., Easton to Elizabethport	1 21
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 40

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$ 84
C. R. R., of N. J., Easton to Pt. Johnson	1 34
Shipping expenses	25
Warfage	10
Total	$2 40

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 84
Morris & Essex R. R. Easton to Hoboken	1 36
Shipping expenses	25
Warfage	10
Total	$2 55

TO SOUTH AMBOY.

L. V. R. R.	84
R. & D. R. R.	1 14
Cam. & Am. R. R.	
Shipping Expenses	25
Total	$2 23

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	84
C. RR. of N. J. Easton to Elizabethport	1 21
Shipping expenses	25
Wharfage	10
Total	$2 40

Freights.—February, 1871.

TO EASTERN PORTS.	From Philadel'a.	From E Port and Port Johnston.	From Readburg	From Rondout
Amesbury	$2 50	$2 00		
Bangor	2 50	1 85		
Bath	2 30	1 75		
Boston	2 0	1 85		
Bridgeport	1 75	1 00		
Bristol	2 00	1 40		
Cambridgeport	2 75	2 00		
Derby	2 00	1 20		
Dighton	2 30	— —		
East Cambridge	2 35	2 00		
Fall River	2 50	1 40		
Hackensack	1 75	1 00		
Hartford	2 50	1 50		
Jersey City	1 4	60		
Middletown	2 25	1 25		
Mystic	— —	1 25		
New Bedford	2 00	1 40		
Newburyport	2 65	1 85		
New Haven	1 90	1 00		
New London	1 76	1 25		
Newport	2 00	1 40		
New York	1 35	60		
Norwalk	1 80	1 00		
Norwich	2 00	1 30		
Patchogue	2 30	1 50		
Portland	2 30	1 50		
Portsmouth, N. H.	1 45	1 85		
Providence	2 00	1 25		
Rockport	2 10	1 65		
Saco	2 25	1 75		
Sag Harbor	1 70	1 20		
Salem	2 35	1 65		
Stamford	2 00	1 00		
Stonington	2 00	1 30		
Taunton	2 30	1 75		
Warren	— —	1 40		
Washington	1 25			
TO RIVER PORTS.				
Albany				
Catskill				
Cocksackie				
Coeyman's				
Cold Spring				
Fishkill				
Haverstraw				
Hudson				
New York				
Nyack				
Poughkeepsie				
Rhinebeck				
Rondout				
Saugerties				
Sing Sing				
Stuyvesant				
Tarrytown				
Troy				
West Point				
Yonkers				

METALS.

NEW YORK, February 3, 1871.

IRON.—Duty: Bars, 1 to 1¼ cents ₱ lb; Railroad, 70 cents ₱ 100 lbs.; Boiler and Plate, 1½ cents ₱ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₱ lb; Pig, 7 ₱ ton; Polished Sheet, 3cents ₱ lb; Galvanized 2½; Scrap Cast, $6; Wrought, 8 per ton.

	Store Prices.
Pig, Scotch No. 1, ₱ ton	29 00@33 00
Pig, American, No. 1	30 00@— —
Pig, American, No. 2	28 00@29 00
Pig, American, Forge	27 00@28 00
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	85 00@100 00

	Store Prices, Cash.
Bar, Swedes, ord'y sizes, less 5 ₱ ct.	— —@110 00
Bar, Refined " "	74 00@ 79 —
Bar, Common " "	70 00@— —
Scroll " "	97 50@125 —
Ovals and half-round " "	97 50@125 —
Band " "	92 50@95 00
Horse Shoe " "	95 —@— —
Rods, ⅜ to 3-16 inch " "	82 50@— —
Hoop " "	102 50@140 00
Nail rod, less 5 ₱ ct.	6½@— —
Sheet, Russia, as to Nos. (gold)	10½@—11
Sheet, Single, D. and T. Common	—4½@— 6
Sheet, Galv'd, Nos. 14 to 26 10 and 12c. Nos. 27, 28, and 29, 13@14	
Rails, English (gold), ₱ ton	— —@58 00
Rails, American, at Works in Pa	70 00 @72 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₱ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ₱ lb; over 11 cents, 3½ cents ₱ lb, and 10 ₱ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ₱ lb	— 15 @— 18
English Spring (2d and 1st quality)	— 7 @— 10
English Blister (2d and 1st quality)	— 10 @— 17
English Machinery	— 11½@— 14
English German (2d and 1st quality)	— 13 @— 15
American Blister "Black Diamond"	— — @— 12
American, Cast, Tool do.	— 16 @— 17
American, Spring, do.	— 9 @— 11
American Machinery, do.	— — @— 12
American German, do.	— 9 @— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ₱ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₱ lb	— @— 30
Copper Bolts	— @— 32
Copper Braziers, 16oz. and over	— @— 32
Copper Nails	— @— 37
Copper, Old Sheathing, &c., clean	19 @— 20
Copper, Chili Pig	— @— —
Copper, American Ingot	22 @— 23¼
Yellow Metal, New Sheating	— @— 23
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ₱ 100 lbs.; old Lead, 1½ cents ₱ lb: Pipe and Sheet, 2¼ cents ₱ lb.

Galena, ₱ 100 lbs	$— — @— —
Spanish (gold)	6 20 @6 25
German, do.	6 20 @6 25
English, do.	6 20 @6 50
Bar (net)	8 75 @— —
Pipe (net)	10 25 @— —
Sheet	10 25 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ₱ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₱ cent.; Roofing 25 ad val.

	Gold ₱ lb.
Banca	39 @—
Straits	33¾@34¾
English	33¼@—

PLATES.

	Fair to Good Brands. Gold.	Currency.
I. C. Charcoal, ₱ box	$6 75 @9 00	$10 00 @10 50
I. C. Coke	7 37½@7 75	8 37½@ 8 75
Coke Terne	6 25 @6 25	7 00 @ 8 00
Charcoal Terne	7 75 @8 25	8 75 @ 9 50

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ₱ lb.

	Gold.
Plates, Foreign ₱ 100 lbs	$5 87½ 6 12½
Plates, Domestic ₱ lb.	8¼ 11¾

REMARKS.

IRON.—Scotch Pig continues dull, and prices are not very firm; we quote, nominally, Glengarnock, $31 @ $31 50, and Eglinton $29—100 tons Glengarnock, gold, on private terms. American continues in active request at full quoted rates—1,800 tons No. 1 and 2 ex. have been taken at a private price. Rails remain quiet but steady at $56 @ $58, gold, for English, and $70 @ $72, currency, for American at the works in Pennsylvania. Store quotations are nominally unchanged. Common English Sheets are plenty, and Singles can be bought at 4¼c., currency—American, from store, is quoted 4¼c. @ 6c. for Singles, Doubles and Trebles.

Import, from Jan. 1st to Jan. 31st, 1871:

	Bar.	Pig. Sheet, etc.
From Foreign Ports	2,261 tons	4,843 bdls, 26,645
Coastwise		
Total	2 261 tons	4,843 bdls. 26,654
Same time, 1870	599	1,440 24,407

LEAD.—Since our last the market for Pig has been very quiet, and we have only to notice sale of 25 tons German, at $6 22½, gold. Manufactured continues steady at our quotations, viz., 8¾c. for Bar, and 10¼c. for Sheet and Pipe, less 10 ₱ cent. to the Trade.

Import, from January 1st to Jan. 31st, 1871:

From Foreign Ports	Pigs...56,691
Coastwise Ports	
Total	pigs...56.691
Same time, 1870	30,927

TIN.—Pig is quiet, though prices are without further quotable change. The latest London telegrams quote Straits £132 10s., and English £135. Sales have been made of 400 slabs Straits at 33¾c., and 5 tons English, 33¼c.; we quote Straits, in a jobbing way, 33¾c., English 33¼c.. and Banca, 39c., all gold. Plates continue in fair request, at full, if not higher prices. The transactions embrace 2,200 bxs. ½d. X Charcoal Tin at $8 62½ @ $8 87½; 200 do. Coke Tin, 14 by 20, to arrive, $7 75; and 1,200 do. Charcoal Terne, $7 75 @ $8, all gold.

Import, from Jan. 1st to Jan. 31st,	1871.	1870
PIGS	No. 6,016	2,402
PLATES	bxs. 36,265	20,119

COPPER.—The manufactures of Copper and Yellow Metal are steady at our quotations. Ingot has become very quiet; there is very little disposition to buy, and an equal indifference evinced by the large holders to sell at present prices; odd lots continue to be picked up at rates below those demanded by the owners of the bulk of the stock. In this way we notice sales of about 150,000 lbs. Lake, at 22c. @ 22½c.

SPELTER.—Foreign is dull, and prices are nominal; 20 tons Missouri Zinc Co. sold at 6½c., gold.

Import, from Jan. 1st to Jan. 31st:

1871.....plates....156,279 | 1870.....plates...291,626

ZINC.—Sheet has been selling cheaper for some time from dealers' hands than from agents, and there is no change, the demand being very light. Am. Ox. 9½c. @ 9¾c.; French, 10c. @ 10½c.; Sheet 8½c. @ 8¾c.; Manganese, 4½c. @ 5c.

Mining Stocks.

NEW YORK, Feb. 10, 1871.

Smith and Parmelee and Grass Valley are the only exceptions to a general decline in the prices of gold and silver stocks, according to the list issued by the Board of Brokers. The sale of 500 shares of the former is reported at 22c.; 2,000 shares of Con. Colorado are reported as having changed hands at 14c. The following comparative table shows the fluctuation in prices:

	Feb., 2. BID.	Feb., 2. ASKED	Feb., 9th BID.	Feb., 9th ASKED
Bates and Baxter	25	27	25	—
Benton	6	8	—	6
Black Hawk	23	40	20	40
Central Gold	9	15	9	15
Consolidated Gregory	24	40	21	30
Grass Valley	6	12	7	10
Gunnell	17	20	—	—
Smith and Parmelee	19	20	22	23
N. Y. & Eldora	20	—	—	20
Quartz Hill	10	15	10	13

San Francisco Stock Market.

[By Telegraph.]

SAN FRANCISCO, Feb. 8, 1871.

	Feb., 2.	Feb., 9th
Savage	45¼	36½
Yellow Jacket	41	41½
Kentuck	33	31
Cholla Potosi	No sales.	75½
Gould & Curry	45½	40
Belcher	9¾	15
Imperial	5	No sales.
Ama or	3¾	No sales.
Crown Point	—	
Hale & Norcross	—	

Petroleum.

Petroleum stocks show considerable variation in prices. The following is a comparative table of quotations for this and the week previous:

	February 2. BID.	February 2. ASKED.	February 9th BID.	February 9th ASKED
Bergen Coal and Oil	—	—	—	50
Bennehoff Run	—	5	10	20
Blood Farm	—	—	—	—
Breevoort	—	—	—	75
Bliven Oil	—	—	—	—
Buchanan Farm	35	—	37	49
Central	69	—	75	80
Clinton	—	—	—	—
Home	195	225	165	190
Phillips Pet	—	—	—	—
Rynd Farm	20	—	19	—
United Petroleum Farms	15	20	15	—
United States	—	80	—	75
National	—	—	—	—
New York & Allegheney	—	—	150	—
Northern Light	—	20	40	—
Pit ole Creek	60	90	60	90
Rathbone Oil	—	—	—	—
Second National	—	20	—	—
Sherman & B	—	50	—	—
Rynd Farm	—	19	19	—
Hoffman	5	8	5	8

The Slate Trade.

[Corrected weekly.]

(A "square" represents 100 superficial feet.)

PRICES OF ROOFING SLATE.

Vermont purple, 1st quality, per square	$6 50@ 7 00
" green, 1st " "	6 50@ 7 00
" red, 1st " "	15 00@16 00
" variegated, "	5 75@ 6 20
a. b'k and d'k blue, 1st qual., "	6 00@ 7 05

PENNSYLVANIA SLATE TRADE.

SHIPMENTS OF SLATE OVER THE LEHIGH VALLEY, AND LEHIGH AND SUSQUEHANNA R. R., AND THE LEHIGH CANAL:

For the week ending January 28, 1871.

LEHIGH VALLEY R. R.

ROOFING SLATE.

Girard Slate Co	— squares
Jones & Williams	35 "
Jones & Town	35 "
D. Williams & Co	35 "
Saylor & Morgan	35 "
H. Williams	— "
Lehigh Slate Co	— "
American Slate Co	— "
Hope	— "
Keystone	— "
Locke	— "
J. Anthony	— "
Kuntz & Woodning	— "
Columbia	— "
Total	150 "

SCHOOL SLATES.

D. Williams	17 cases.
Lehigh Slate Co.	58 "
Locke Slate Co.	219 "
A. W. Leich	20 "
H. W. Harper	10 "
Total	324 "

BLACK BOARDS.

Yerkes & Martin	18 "
Lehigh Slate Co	1 "
Total	19

MANTELS.

Yerkes & Martin	26 "
Lehigh Slate Co	24 "
Total	50 "

LEHIGH AND SUSQUEHANNA R. R.

SCHOOL SLATE.

A. W. Leich	50 cases.

Fair Haven, Vt.

Report of Slate Shipped from Fair Haven, via the R. & S. R. R., for the week ending February 4, 1870, and for the year.

ROOFING SLATE.

NO. OF SQS. SHIPPED BY,	WEEK.	PREVIOUSLY.	YEAR.
Scotch Hill Slate Co.	..	..	..
Joseph Sheldon	..	..	..
A. Allen	..	..	..
Union Slate Co.	80	..	80
R. M. C peland	..	..	..
F. H, M. & M S. Co.	..	..	..
Benjamin Williams	..	..	..
E. E. Loyd	..	..	..
D. K. Graves	75	..	75
Total	155	—	155

MILL STOCK—MANTELS.

NO. PIECES SHIPPED BY,	WEEK.	PREVIOUSLY.	YEAR.
F. H. M. & M. S. Co.	..	..	..
Union Slate Co.	170	..	..
S. Allen	..	..	..
Total	—	—	—

FINISHED MANTLES.

NO. OF CASES SHIPPED BY,	WEEK.	PREVIOUSLY.	YEAR.
F. H. M. & M. S. Co.	100	..	..
Burke & Kellogg	..	..	..
Union Slate Co.	36	..	..
Total	186	327	513

NO. BILLIARDS AND BLACKBOARDS.

F. TOF CASES SHIPPED BY,	WEEK.	PREVIOUSLY.	YEAR
O H. M. & M S. Co.	..	..	..
Union Slate Co.	108	..	..
S. Allen	60	..	..
Total	168		

The Mineral Region of Ohio and its Development.

THE returns of iron manufacture for the year show the following result:—Pig iron manufactured, 111,074 tons. Of this 74,221 tons were smelted with charcoal and 136,853 tons with stone coal. Bar and nail iron, 27,585 tons; nails, 8571 tons; hoop iron, 498 tons; sheet iron, 648 tons; stoves, 8631 tons; car wheels, 3507 tons; other castings, 10,711 tons; spikes and railroad chairs, 706 tons; railroad iron, 9167 tons. A comparative view of the pig iron manufactured in a series of years is shown in the following table:

Year.	Tons of Iron.
In 1840	25,050
" 1850	52,658
" 1860	105,500
" 1863	50,704
" 1864	62,536
" 1865	63,991
" 1866	81,790
" 1837	167,591
" 1868	207,746
" 1869	211,074

The following counties are reported as engaged in the manufacture of pig iron:

Counties	Tons.
Columbiana	18,377
Cuyahoga	3,150
Gallia	2,105
Hamilton	100
Jackson	11,024
Jefferson	12,261
Lawrence	6,250
Mahoning	41,721
Muskingum	1,624
Ross	2,028
Scioto	6,225
Stark	8,900
Trumbull	
Vinton	12,505

Hamilton has no iron in it, and iron is manufactured in Erie, in Tuscawaras, and largely in Hocking, counties not mentioned above. Iron, that is, pig metal, is now manufactured in eighteen counties, and it is produced in at least twenty.

To the above tables we add those of the Commissioner of Statistics (E. D. MANSFIELD) up to the year 1850 inclusive.

In the following tables will be found the results of twenty years' experience.

OF IRON.

Furnaces.	Tons pig iron.	Hands.	Value.
In 1840..19	25 959	1,257	$648,975
" 1 50 35	52,658	2,415	1,255,850
" 1860..59	105,500	6,000	3,171,000

Increase since 1850, 100 per cent.

The increase of furnaces since 1840, and the centres of iron mining, may be seen from the following comparisons by counties, viz.:

	In 1840.	In 1860.
Gallia	0	1
Hocking	0	3
Jackson	1	12
Lawrence	10	14
Mahoning	0	7
Scioto	5	9
Vinton	0	6

Counties having 16 furnaces in 1840 now have 52; and the counties Hocking, Vinton and Mahoning, which had no furnaces in 1840, now have 14. The county of Jackson, which had 1, now has 12. One-half the pig iron made in the State is made in the two counties of Jackson and Lawrence. There is a large belt of iron, comparatively untouched, because it is more remote from the rivers and railroads. In time it will gradually come into use.

IRON ORE AND PIG IRON.

Owing to a prolonged strike of the coal miners in the Mahoning and Shenango Valleys, early in 1868, it is estimated that the production of pig iron at this point was lessened at least 30,000 tons. There are 45 furnaces whose ore is received through this port, and 15 have Cleveland shareholders, 9 of which are controlled here. There are seventy furnaces which make their ore contracts and settlements at Cleveland. Of these, 4 use anthracite coal, 7 use charcoal, the rest bituminous coal or coke. There were 7 furnaces built in 1868. The largest proportion of pig iron used by the various iron works at Cleveland is bought directly from the makers, and the consumption cannot be accurately stated. The quantity sold by commission dealers is 19,049 tons, of which 12,012 tons were charcoal and 7,037 tons bituminous irons.

IRON WORKS.

The following exhibit shows the amount of iron produced during the year 1868:

	Tons.
Pig iron	11,037
Railroad iron	22,314
Merchant iron	11,396
Boiler, tank and sheet iron	2,676
Forgings	4,125
Nuts, washers, rests, nails and spikes	5,607
Machinery castings	18,250
Wire	865

The consumption of coal and coke, as nearly as can be ascertained, was about 225,000 tons. There are some 14 rolling mills in operation in and about the city, having some 200 puddling furnaces and a daily capacity of 400 tons of finished iron, not including the rails, spikes, nuts, bolts, horse-shoes, etc. Several of these mills own their own blast furnaces, and nearly all have coal mines of their own.

This is a wonderful exhibit for so new a town as Cleveland, and almost all of it has grown up in the last ten years. There are 6,000,000 bushels of coal used in Cleveland for the sole purpose of manufacturing iron. In the above statement of the Secretary there are 3150 tons of pig iron set down to Cuyahoga county, while in 1869 there were 11,937 tons made in Cleveland. We shall not here dwell particularly on the advantages Cincinnati has, but we undertake to say that beginning ten miles east of the Scioto, and going to within ten miles of the Muskingum, there is a far greater deposit of iron and coal, of the very best quality, than there is in any other part of the State.

The furnaces of the State, as given under the census and by the Commissioner of Statistics, are as follows:

In 1840, 19; in 1850, 35; in 1860, 59; in 1870, 80.

The increase of furnaces does not show the whole truth. In the last ten or twelve years the product of a furnace, under the improved modes of manufacture has doubled, so that the furnaces are not a criterion. If there be, as we suppose, at least 80 furnaces, the product of pig iron exceeds 300,000, and we think that is little enough.

A comparative view of the amount of stone coal mined in Ohio for a series of years, is given below:

	Bushels.
In 1863	26,887,899
" 1864	40,527,291
" 1865	34,290,359
" 1866	42,130,021
" 1867	46,703,820
" 1868	55,264,392
" 1869	54,955,057

Upon this subject the Secretary remarks:

"In my last report I expressed the opinion that these estimates are all too low. Upon further investigation, I am satisfied that not a quarter of our coal production is given in the above statement. To illustrate: Hocking county is reported as mining during the year 1869, but 27,898 bushels of coal, while I have information, entirely reliable, that Peter Hayden, in his mine in Greene township, of that county, mined during the year 1869, 2,100,000 bushels. We must await some better system of collecting statistics of this vital branch of productive industry before instituting comparisons, or venturing any comment."

With a good deal of experience in getting this class of statistics, we agree with the Secretary that not more than one-fourth of the coal produced in this State is represented in the above table. But the table is probably correct in representing that from 1863 to 1869 (inclusive) the production of coal has doubled. In 1860 no coal was seported as mined in Green township (Hocking), to which the Secretary refers; but in Ward township 450,000 bushels were dug. This example shows what prodigious errors get into our statistics of entry—[*Railroad Record.*

The Siemens Furnace.

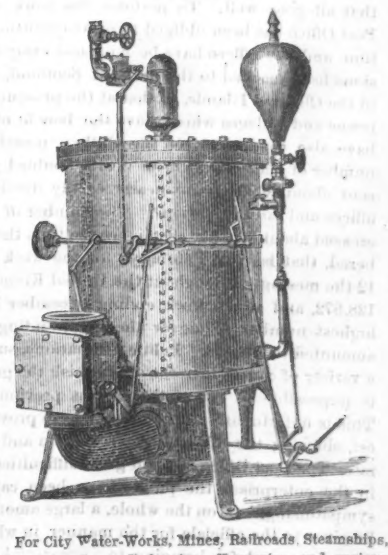
THIS important furnace affords a remarkable instance how what is, apparently, a single invention, sometimes merges itself into an actually new process. In other words, a highly improved apparatus is sometimes seen to expand itself into a new art. This is the case with its application to melting steel in lieu of the crucible furnace; and if we may term the product of the old Huntsman process of melting blister-steel in crucibles, "pot-steel," so the steel made by the Siemens-Martin process might be specially called furnace-steel. Its other applications are also extending, and the Crewe Bessemer Works are being surpassed in the number of Siemens furnaces, by those at work for the Barrow Hematite Steel Company. Messrs. HANNAY & SONS, of the Blochairn Ironworks, the senior partner of which firm was once of the Schneider & Hannay, now merged into the Barrow Company, are working more than fifty of these furnaces for puddling; and there is now a likelihood that they will be adopted by BOLCKOW & VAUGHN, and elsewhere in the Cleveland district. This furnace, as might be expected by those who know its construction, is more likely to be successful in its extended applications than when only two or three are used. Used on a large scale, systematic and complete supervision can be afforded. A common set of grate bars is kept going, with more or less waste, by a laborer at fifteen shillings a week; but this cannot be the case with an apparatus the efficiency of which must depend on its very scientific refinement. On the other hand, the future of furnace work certainly belongs to well-managed gas furnaces. —*The Engineer.*

Momentum.

WHEN two locomotives, having equal speed on a rail-track, meet from opposite directions, the shock actually destroys the momentum of both, and therefore makes a dead halt. The force of the shock produced by the two bodies, say the philosophers, will be equal to the force with which either, being at rest, would sustain if struck by the other moving with double the velocity. Action and reaction being equal, both bodies will be as much moved by reaction as by action.

Should two railroad trains, running toward each other at the rate of twenty miles an hour, collide, the shock would be precisely the same as though one had been at rest and had been struck by a train moving forty miles an hour. Were two steamboats run directly together, head on—one going twelve and the other fifteen miles an hour, the concussion or shock each would suffer, would be the same as though struck by the other at a speed of twenty-seven miles an hour. Without stopping to philosophize upon the cause, boxers and pugilists know by dear-bought experience that the worst blows they ever receive in their combats are when a fist strikes a fist, because the force suffered by both parties is equal to the sum of the forces exerted by either arm. The adroit fighters, therefore, avoid encounters of that kind, if possible.

PATENT AUTOMATIC STEAM VACUM PUMP.



For City Water-Works, Mines, Railroads, Steamships, Breweries, Sugar Refineries, Tanneries, and various Manufacturing Purposes.

Manufactured by the Automatic Steam Vacum Pump Manufacturing Co. Office, 111 Broadway, New York.

SIMEON N. DRAKE, Pres. MARTIN KLENEN, Sec.

Send for Illustrated Circular.

Tin Scraps.

THE Geological Museum of the General Land Office has just received samples of bar iron made from tin cuttings, also various tin salts for dyers' use, prepared from the superficial coating of refuse tin scraps, intended for exhibition in the geological cabinet of the office. These tin scraps, generally termed "tinners' waste," are the refuse of manufacturing works, and never, heretofore, utilized in any practical manner. Tin being worth from $30 to $35 per cwt., and the iron contained in them at least $30 per ton, this refuse, if properly worked up, would consequently yield a handsome profit.

It is true that many attempts have been made to employ and utilize this waste, yet without much success, owing to the fact that neither of the two metals could be reclaimed in a pure state. Although the tin could be seperated from the clippings, in a manner by which the iron would be left entirely free from tin, the latter (tin) taking up the iron in this case, although in minute quantities, effectually neutralizes the most valuable properties of this metal. On the other hand, if the tin is removed by means of chemicals, from which it could be recovered in a pure state, and if the remaining iron scraps were not left free from tin, a small quantity, say a half of one per cent. of tin, would turn the best iron into an alloy of but little value.

The importation of tin plates to the United States amounts to about twelve millions of dollars annually, of which it is estimated that one-fourth is entirely wasted. A. R. R.

GEOLOGICAL ROOMS, GENERAL LAND OFFICE,
Feb 7, 1871.

Telegraph Progress in 1870.

IT is only on casting a retrospective glance through the year past that one really becomes aware of the great progress made; the changes are so gradual in many cases as to be almost imperceptible, but when we compare telegraphy at the present time with its condition at the beginning of the past year, we see at once the importance of the changes, and the great extensions in telegraphy in every direction.

In reviewing the telegraphic changes and extensions during the year, we cannot but allude to the altered condition of telegraphy at home. At the beginning of last year telegraphy was in the hands of various private companies, who charged high prices for their telegrams; we find ourselves now telegraphing by a Government department, and at a low and universal tariff. Such a change cannot be looked upon but as a great enterprise; the actual transfer itself was a great undertaking, but to institute at once a cheap and general tariff was a plan of no mean dimensions. It was usually found by the old telegraph companies that a reduction in charge brought about almost invariably a very large increase in traffic. Imagine the effect at the time of transfer upon a system extensive enough only for the carriage of high priced messages having suddenly thrown upon it an enormous quantity of business. Delay was a natural consequence, and remained so for a long time. The transfer was arranged in the previous year, but the actual change itself is one of the great events of 1870. It has unquestionably turned out a success, and the system now works admirably; it cannot be denied but that it met with some failure at the commencement, but this arose from exceptional causes. First came the enormous increase of traffic thrown upon a limited system; next, what was termed "atmospheric causes," or the extraordinary weather that causes damage everywhere. However, this damage was due entirely to the many lines being in such a bad state. The transfer had been talked of for a long time, and as long as it was *sur le tapis*, so long did the various telegraph companies refrain from extending their systems, and we are sorry to say that several of them abstained from spending what was usual for renewals and maintenance. This culminated at the time of the transfer, by severe weather carrying all the wires away that had been treated with such cheeseparing policy. The several companies got their full claims paid, but we certainly should like their property to have been paid for at its value. Since that time, an enormous portion of these systems has been entirely renewed, and the effect is now that all goes well. To perform the work satisfactorily, the Post-Office has been obliged to make extensions in every direction, and new offices have been opened everywhere; the extensions have reached to the north of Scotland, and in the south to the Channel Islands, so that at the present time most of our towns and villages which have the benefit of the penny post have also the benefit of the shilling postal telegram. The number of stations has been nearly doubled; they now represent about 3600, being nearly evenly divided between post-offices and railway stations. The number of messages has increased about fifty per cent. since the time they were first numbered, that is, from February; for the week ending February 12 the messages throughout the United Kingdom amounted to 128,872, and to the week ending December 17 to 181,636, the highest number being for the week ending July 23, which amounted to 234,194. Political situations, summer traffic, and a variety of causes increase or diminish the general traffic. It is impossible to get at the returns previous to the transfer. This is unfortunate, as they would have proved of great interest, showing the effect of the reduction and of the universal rate. The Post Office has had great difficulties to contend with in the enterprise; the public have been captious instead of sympathising, but, on the whole, a large amount of praise must be given to the officials for the manner in which the work has been done, and for bringing to a successful condition so important a work. To Mr. SCUDAMORE the greatest credit is due for his untiring energy and perseverance, and the further working of the universal telegraph will still have his thoughtful care, and all that can be, will be done to make the telegraph as efficient and complete a service as the postal.

A large cable is now being manufactured at Silvertown for the Post Office for increasing the Irish accommodation. This cable is about the most massive ever manufactured, and contains as many as seven conducting wires; it will in all probability be submerged during the course of next month.

It is as regards submarine telegraphy that the greatest activity has prevailed during the past year. Not only has a very large amount of cable been manufactured, but a quantity of that manufactured during the past year has been submerged. The following tabulated statement will place before our readers a condensed account of the works actually completed and in progress:

STATISTICS OF SUBMARINE TELEGRAPH CABLES, 1870.

COMPANY.	CABLE.	Total length.	Length manufactured.	Length submerged.	CONTRACTOR.
		knots.	knots.	knots.	
British Indian	Suez to Aden	1550	1550	1460	Telegraph Construction and Maintenance Company.
	Aden to Bombay	2050	2050	1818	
	Falmouth to Lisbon	872	872	823	
Falmouth, Gibraltar, and Malta	Lisbon to Gibraltar	380	380	331	
	Gibraltar to Malta	1264	1264	1120	
British Australian	Batavia to Singapore	563	563	563	
	Java to Port Darwin	1163	70	....	
British Indian Extension	Singapore to Penang	1834	1834	1800	
	Penang to Madras				
Marseilles, Algiers, and Malta	Marseilles to Bona	862	862	862	W. T. Henly.
	Bona to Malta				
	Grecian Archipelago	120	120	60	Telegraph Construction and Maintenance Company.
Anglo-Mediterranean	Malta and Alexandria	972	972	906	
China Submarine	Singapore to Hong Kong	1632	1636	....	
Great Northern Telegraph	Hong Kong to Shanghai	1098	1098	....	Hoopers.
	Shanghai to Possietta	1198	1198	....	
Submarine	Beachy Head to Havre	70	70	70	W. T. Henly.
Post Office	Dartmouth to Guernsey	94	94	66.5	Bullivant and Allen.
Do.	Guernsey to Jersey			17.0	
Do.	do. do.	20	20	17.5	W. T. Henley.
Do.	Guernsey to Alderney	20	20	17.0	
Do.	Portpatrick and Donaghadee	21	....	21	
Cuba Submarine	Batabano to Santiago di Cuba	530	540	540	
West India and Panama	Cuba to Jamaica, and rest of the islands	2613	2613	800	India-rubber, Gutta-percha, and Telegraph Works Co.
Panama and South Pacific	Panama to Peru	1100	1100	....	
Post Office	Holyhead and Dublin	64	50	....	
Do.	Wexford shore end	16	16	....	
Franco-Egyptian	Marseilles and Algeria	500	350	....	
		20,556	19,278	11,292	
	Less manufactured in 1869	.....	4,710		
	Total manufactured in 1870	.....	14,568		

The above, therefore, shows the enormously large total of 19,278 knots manufactured and 11,292 knots submerged; the latter is correct as far as can be learnt, but the former amount is in excess of the quantity manufactured during the past year, as it embraces a large portion made in the previous year. Of these cables the British-Indian of 3,600 miles is the most considerable, the whole of this was manufactured and shipped in 1869, but the laying of the cable and its opening for traffic did not take place until the spring. Of the Falmouth, Gibraltar, and Malta Cable, about 600 miles were manufactured in the previous year, and about 510 miles of the West India and Panama. Deducting these amounts, the gross total of cable made during the past year has actually reached as high as 14,568 knots.

The early part of the year witnessed the completion and opening for the public service of the double overland line belonging to the Indo-European Telegraph Company. This line, making connections with our Government lines from Teheran to Boombay, has met with great success; the working has been done well, the only serious interruption having occurred through the breaking of the Black Sea Submarine Cable.

Shortly after the opening of this line, the British Indian Company's cables were laid from Bombay to Aden, and Aden to Suez, and immediately afterwards opened for traffic. Messages have been forwarded by this route with only one interruption, that due to the breakage or the Suez-Aden Cable about 100 miles from Suez.

Later on in the year, the submarine cables of the Falmouth, Gibraltar, and Malta Telegraph Company were successfully laid, and completed the last links in the chain of through submarine telegraph communication betweem England and India; the successful completion of this was celebrated by a conversazione given by Mr. Pender, at which the Prince of Wales was present. An interruption occurred lately in the Libson and Gibraltar section of the company's system which, unfortunately, still remains out of order.

Of the other cables, the Batavia and Singapore section of the Australian cable has been laid very lately; the manufacture of the remainder is progressing. In connection with the Australian cable we must mention the land lines undertaken by the Australian Government, alluded to in our last number. The two sections of the British-Indian Extension Company's cable have been successfully laid, and the expedition, by our latest account, have successfully accomplished their work.

A second cable was laid from Malta to Alexandria, the extra traffic brought by the opening of the British-Indian line necessitating this step.

Of the Great Northern Telegraph we learn but little. One section—Hong Kong to Shanghai—has arrived out, and a commencement has been made in laying the cable, but the present tempestuous season has interfered with the work, and has caused considerable delay.

The extension to the Channel Islands we have alluded to, and so lately having ventilated the subject, it is needless to recur to it here, beyond mentioning the fact that the opening of the cables for traffic was the occasion of great public rejoicing in the Islands.

The West India cable expedition has not up to the present been very successful, only a very small portion of the work being accomplished. Unfortunately the effects of climate have been so great as to diminish the staff considerably. Yellow fever is a dangerous enemy to cable laying, and it is a question that should be asked, Why will they insist on sending expeditions out to the West Indies at the most unhealthy season of the whole year? Can the want of success be wondered at?

The Beachy Head, Wexford, and Dublin, are the only multiple cables amongst our list, the former having six, the others two, four, and seven respectively. The latter is distinguished from preceding cables by its massiveness and the extra protection of tarred tape applied to the external wires.

The Mediterranean cable is a specimen of a purely light form, consisting only of an india rubber covered wire, without external sheathing. The war on the Continent has interfered with its submergence.

Great as the success attending cables has been this year, it is a matter of some regret that they have not been without reverses. Many of our home cables have been broken and repaired; the Red Sea and the Lisbon and Falmouth have been broken; the 1866 Atlantic has been broken twice, and the 1865 one for the first time. The two Atlantic and the Lisbon cables are still speechless. The St. Pierre section of the French Atlantic has also been broken, but was repaired.

Turning to the general features of telegraphy, we may mention the general adoption of the Léclanché battery for telegraph purposes, and the increased use of the Wheatstone Automatic Telegraph for the purposes of speedily transmitting messages. The old double needle instrument is now being rapidly abolished; the single needle and printing one takes its place, to the manifest acceleration of business.

Numerous telegraph companies have appeared during the past year, some have floated, while others again have sunk: too many enterprises were afloat at the same time, and the public confidence had disappeared. Amongst the enterprises we particularise one as entirely novel: the establishment of a floating telegraph station at the mouth of the Channel; this was successfully accomplished; a ship, the Brisk, was anchored and connected with the shore, and the communication was maintained for some time, but proving somewhat of a commercial failure, the ship was removed, and the cable picked up again.

A joint purse arrangement was established with the several Atlantic cables, and lately the tariff has been increased on account of the number of messages being too great for the only working cable.

One of the greatest improvements introduced for some years into submarine telegraphy dates from the present year; namely, the introduction into submarine cables of WILLOUGHBY SMITH'S improved gutta-percha; by the use of this the inductive capacity of the insulated wire is reduced 20 per cent., bringing it in that respect on a par with india-rubber. This alteration not only improves the rate of signalling, but effects an economy on account of the smaller quantity of material being required.

On the whole we cannot but regard the work of the year as teeming with importance. Great and vast have been the improvements, large and important have been the extensions. New communications have been opened up in every direction; our distant colonies are being daily brought nearer and closer to us by the friendly bonds of telegraphy. The year has certainly been most fruitful in telegraphic work, and in no branch of engineering has there appeared so much activity. But whilst congratulating ourselves on the good done, let us not forget to say a passing, but well merited, tribute to one who has worked long and faithfully in the telegraphic field. To the researches of the late Professor MATTHIESSEN we owe much for the present state of submarine telegraphy. No one has labored more than he to improve our conducting wires and units of measurement. It is with deep regret we lament his untimely end, and wish that his life had been spared to add more and more to those labors, the result of which, as contributed to the British Association, form a fitting monument to a life spent for the public benefit.—*Engineering.*

A VERY desirable article has recently been invented. Is is an adjustable rubber lip for bowls, basins, and cups. It enables one to pour liquids from dishes without spilling the contents, and soiling other articles, such as table covers, carpets, etc.

THE ENGINEERING AND MINING JOURNAL.

CONTENTS FOR THIS WEEK.

[*Illustrated Articles are marked with an asterisk.*]

The Characteristics of Lodes	97	Narrow Gauge Railways in the United States	105
Coal Mining in England	98	An Important Patent Case	105
Steam Boiler Explosions	99	Central American Sulphurets—Method of Manipulation in Guiana	105
The Railway Problem in Massachusetts	99	Petroleum from Ecuyador	106
The European Coal and Metal Markets	100	Placer Mining in California	106
Mining—Summary	100-101	Floating Docks	107
MARKET REVIEW	102	Notes on Assaying	107
THE SLATE TRADE	103	OFFICIAL LIST OF PATENTS	107
The Mineral Region of Ohio and its Development	103	Business and Personal	108
Tin Scraps	104	Important to Inventors	108
Telegraph Progress in 1870	104	Advertisements	109
EDITORIALS:			

ROSSITER W. RAYMOND, Ph. D., Editor.

PUBLISHERS' ANNOUNCEMENT.

THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.*

SUBSCRIPTION—**$4** *per annum in advance;* **$2 25** *or Six Months.*

ADVERTISEMENTS.—*The rates are as follows: Inside pages,* **25** *cents per line each insertion; the outside or last page,* **40** *cents per line. Payment required in advance.*

NEWS-DEALERS *will be supplied through the agency of the* AMERICAN NEWS COMPANY, *No.* 121 *Nassau street, New York City.*

COMMUNICATIONS *of all kinds should be addressed to the Publishers. The safest method of transmitting moneys is by checks, or Post-office orders, made payable to their order.*

Correspondence and general communications of a character suited to the objects of THE ENGINEERING AND MINING JOURNAL *will always be welcome.*

The Postage on THE ENGINEERING AND MINING JOURNAL *is twenty cents a year, payable quarterly, in advance, at the office where received.*

WESTERN & COMPANY,
Publishers,
37 PARK ROW,
NEW YORK CITY.

P.O. Box. 5969.

Narrow Gauge Railways in the United States.

THERE are few questions of more practical and pressing importance in the present day than the best means to be adopted for extending our railroad system (carrying with it as it does fresh life and energy into all the districts which it penetrates), into the Territories and other parts of this vast Union, where the traffic to be expected, at any rate for years to come, cannot be such as to warrant a large capital expenditure.

It is therefore with much satisfaction that we place before our readers the following information kindly given to us by Sir CHARLES FOX & SONS, the well known civil engineers of London, who have for many years been actively engaged in practically working out a similar problem in Australia, India and Canada.

Their object has been to construct railroads, which, whilst very economical in first cost, should be substantially built and equipped, and therefore operated and maintained at a moderate percentage of the gross income.

Mr. CARL PIHL, the engineer of the government railway of Norway, has also for some years been carrying out very successfully a system almost identical with that under review.

The question of gauge is one which requires to be determined after careful investigation of the circumstances in each case. Where a standard national gauge exists, caution must of course be exercised in introducing any diversity; and yet it may, upon examination, be found that to adhere in all cases to the gauge suitable for trunk roads would be to check, nay, even to prevent, the construction of many tributary or branch roads, in themselves most necessary for the development of the country. Thus, in the vast empire of India, where the trunk roads have the 5 feet 6 inch gauge, the government is seriously and favorably entertaining the question of adopting a much narrower gauge for the tributary roads, to open up the country.

With the above reservation, Sir CHARLES FOX & SONS, and others interested in this question, have found, after an experience spread over many years, that the most economical gauge for such tributary roads which can be used with advantage is that of 3 feet 6 inches. A broader gauge than this is, in their opinion, for speeds of 25 miles an hour and moderate traffic, quite unnecessary, and of course involves additional outlay, especially if the country is of a hilly nature. To use, on the other hand, a narrower gauge than 3 feet 6 inches is likewise very objectionable, and especially so where wood is the fuel chiefly employed, as on very narrow gauges it becomes impossible to use either boilers or fireboxes of such dimensions as to give satisfactory results.

The following are given as examples of railroads which have been built, or are now in progress of construction upon this gauge:

EXAMPLES AND COST IN GOLD,

Including in each case stations, rolling stock, engineering and all management expenses.

1st. The Queensland Railways, Australia. Length, 222 miles; gauge, 3 feet 6 inches. Wages: skilled laborer, $2 50 to $3 10; ordinary do., $1 50 to $1 75. Average cost per mile, $32,000.

2d. The railway from Conyeveram to Arconnur, India. Length, 19 miles; gauge, 3 feet 6 inches. (Land and portion of road-bed given by Government.) Materials chiefly sent out from England. Rails 35½ pounds, iron. Average cost per mile, $19,000.

3d. The Toronto, Grey and Bruce, and the Toronto and Nipissing Railways, Canada. Length of first section, 193 miles; gauge, 3 feet 6 inches. Wages: ordinary laborer, $1 to $1 50. Average cost per mile, $14,150.

4th. The Government railways, Norway (constructed by CARL PIHL, C.E.). Length, 106 miles; gauge, 3 feet 6 inches. (Rails and many other materials sent out from England.) First, through easy country, $15,900 per mile; second, through heavy country, $23,700 to $26,150 per mile.

It will be seen that, the two first of these principles being conceded, it at once becomes possible to construct a thoroughly substantial track with rails not weighing more than from 30 to 40 pounds per linear yard, provided that the ties are laid sufficiently close, the rails well fished at the joints, and an ample supply of ballast provided.

The speed of twenty-five miles an hour is found in practice to be more than sufficient for tributary roads. A load of four tons per wheel is sufficient to enable the passenger and freight cars to be of ample dimensions for convenience of traffic.

The passenger cars of latest design are of the usual American type, thirty-two feet long, exclusive of platforms, and eight feet six inches wide, carrying very comfortably thirty-two passengers. Their centre of gravity being very low, they run with great steadiness. The box cars are fifteen feet long and eight feet six inches wide. The platform cars are twenty-four feet long and eight feet six inches wide, and carry ten tons, their own weight being only five tons.

It will thus be seen that the non-paying load, or dead weight, is reduced from the usual proportion of one-half to one-third of the gross weight; and from this results an important saving in operating expenses.

The locomotives are generally of two types.

Type 1, or freight engine, has eleven-inch to twelve-inch cylinders; six coupled wheels, three feet three inches in diameter, and a four-wheeled bogie, and weighs about twenty tons, exclusive of tender.

Type 2, or passenger engine, has ten-inch to eleven-inch cylinders, four coupled wheels, three feet three inches in diameter, and a four-wheeled bogie, and weighs about sixteen tons, exclusive of tender.

The maximum grades vary from 100 to 132 feet to the mile. The sharpest curves are of from 500 to 330 feet radius. The grading has generally a width in cuts of fifteen feet, and on banks of twelve feet. The bridges are sometimes of iron, with masonry substructure, sometimes altogether of timber. The depots are of neat but economical design. The railroads are generally fenced throughout.

On the Canadian roads careful arrangements are made to protect the track from snow, and to provide in every detail against the effects of frost.

The cost of the Canadian roads, viz., about $14,000 per mile, may be taken to fairly represent the probable outlay (including every expense of right of way, management, etc.) for the building and equipping of a road of this gauge through an undulating and well-settled country, involving considerable expenses for right of way, say, 15,000 cubic yards of grading per mile; frequent road-crossings, fencing throughout, and a fair proportion of bridges, depots, side-tracks, and an ample equipment for a considerable traffic.

On the other hand, in the great prairie country of the West, where right of way, grading, and bridging are at the minimum, where 36 lb. rails would be ample, where fencing is not necessary, and where the provision for depots, side-tracks, and equipments could be materially reduced, a well constructed and substantial railroad of the 3 ft. 6 in. gauge may be completed *and equipped* ready for operating, with an expenditure not exceeding from $8000 *to* $10,000 *per mile*, and on such a road, as both grades and curves would be easy, trains carrying a net load of 100 tons of freight could be operated with facility, at a speed of from 20 to 25 miles per hour.

OPERATING.

So far as the gauge is concerned, the cost of traction would be very much the same per train-mile, and per ton as on railroads of the ordinary 4 ft. 8½ in. gauge, were it not reduced by the much more favorable proportion which the net or paying load bears to the gross weight of the train. Moreover, in consequence of the lower speeds and the light-rolling loads there is on these light railways a most important saving in wear and tear, both of tracks and equipment, and the total cost of operating is therefore considerably reduced.

We earnestly commend this subject to our friends in the West who are interested in the opening out and settlement of districts not yet supplied with railroads, and refer them for more detailed information to Sir CHARLES FOX & SONS, 6 Delahay street, London.

An Important Patent Case.

AMONG the world's benefactors in the origination of labor-saving machines is ALBERT F. JOHNSON, of New York, who was among the pioneers in perfecting, bringing out and offering to the public a sewing machine. His was, in fact, the first successful single-thread machine; and its principal features are now incorporated into every single-thread machine manufactured. Soon after Mr. JOHNSON perfected his invention, he procured a patent; and a company was organized, which commenced operations in Boston in 1857. For a want of proper financial management, this company failed and went into bankruptcy under the insolvent laws of Massachusetts, when this patent, with JOHNSON'S entire interest, passed beyond his control. For this reason he failed to realize any remuneration for his time, ingenuity and expense in inventing, perfecting, patenting and introducing his invention to the public. But the right to an extension of this patent has since its issue always remained vested in Mr. JOHNSON. In accordance with this vested right, he recently made an application for the extension of this patent, through the agency of WESTERN & COMPANY, who have been successful in getting the patent extended; and Mr. JOHNSON has made arrangements with responsible parties by which he will be able to realize a large amount for the extended term of his patent. It is not unfrequently the case that the extended term of a patent is far more valuable than the whole of the original term. The reason is, that all prejudices have been overcome and the utility of the invention made known to the public. It would therefore be for the interest of most patentees to get their patents extended. But many of them say or imagine that some subsequent and similar machine, process, or apparatus has superseded their own, in which may have been, nevertheless, incorporated many of the essential features. In all cases of the kind, we advise patentees to extend and re-issue, or, if the patent has not too nearly expired, to re-issue first, thus adding strength as well as time to the life of the patent, and making it operative and available to the patantee.

It should be borne in mind that the patentee, and he only, can apply for and obtain an extension. All previous assignments or sales of the original patent do not affect this right. The law inquires only whether the original inventor has been sufficiently remunerated. If he has not received the reward he deserves, then the law gives him another opportunity, provided his invention was really new, and his failure has not been the result of his own negligence. Patentees should never transfer or assign in advance the right to an extension. The assignment gives the assignee no right to apply, and its existence may prove fatal to the application of the patentee.

WESTERN & COMPANY are successfully prosecuting many cases of extension.

SCHOOL OF MINING & METALLURGY
UNIVERSITY OF MINNESOTA

Central American Sulphurets—Method of Manipulation in Guiana.

By ARTHUR LAKEMAN, Mineral Assayer.

THOSE gentlemen who are practically acquainted with the method of decomposing sulphurets and the scientific amalgamation of the precious metals will be somewhat astonished on reading the following. The tract of land, divided into three colonies—British, French and Dutch Guiana—is certainly fabulously rich in minerals. Sir WALTER RALEIGH, the great English navigator, prognosticated that that country would one day become the El Dorado of the world. Two years ago I took a lease of the claim and plant of the British Guiana Gold Mining Company, situated on the Cuyuni River, adjoining Venezuela. I prospected there for three months, making assays of both placer and quartz sulphurets. The placer sulphides certainly come under the generic term of arsenical pyrites, but there were other baser minerals in connection, which required chemical treatment, as well as that in the reverberatory furnace, to effect decomposition. Concentrated *debris*, thoroughly clean and impartially sampled, yielded over $2000 to the ton. From assays of the tailings of the company I found that they had actually lost over 50 per cent. of the metal existing in the mineral, as shown by fire assay.

Professor CHANDLER and other prominent chemists analyzed samples collected by myself.

The British Guiana Company used shaking tables for amalgamation; but I manipulated one ton of concentrated tailings—using a quicksilver cradle with an amalgamated sheet of copper in connection with a powerful galvanic battery—and obtained 14 ozs. 9 dwt. 18 grs. of metal, 23⅞ carat fine. The quartz averaged, before concentration, 2 ozs. per ton. The mines in these regions would undoubtedly stand a fair chance of speedy development but for the climate. White men almost invariably have to succumb, under the influence of a scorching sun, during the day, and heavy miasmas mornings and evenings. Dutch Guiana is much the healthiest of the three colonies. I visited the French territory above Cayenne, on the River Sinamary; here I found some fifteen placer claims in full operation. Each claim employs about 200 creole French negroes, and the appliances with which they endeavor to treat the mineral are the primitive "long-toms" and ordinary sluice; they are very badly managed, too much water being used with a view of putting a greater quantity of mineral through. I have picked up amalgam 500 yards below the "long-tom," as well as specks of free gold, which had no time to sink, the water carrying away mercury, gold, and mineral *en masse*. These sable miners squeeze their mercury through a piece of thin cotton cloth and burn off the mercury amalgamated with the gold. A quicksilver retort is unknown in this part of the world. The gold is usually very fine and light (I never saw but four nuggets there and the largest weighed less than two ounces), consequently a great deal flows away. I might venture to say that between 70 and 80 per cent. is, to the unskilled miner, irretrievably lost; irrespective of the lightness of the gold the sulphurets are of so slimy a nature that the surface of the quicksilver becomes coated with a substance much worse than grease.

Clean washed sulphurets, separated from the free gold, obtained from the claim of the New York and Surinam company, yield practically nearly $2000 to the ton, and on this company's claim there are several ledges, the ore of which contains silver, gold, antimony, plumbago, etc., etc. Magnificent timber, together with water appliances for driving very powerful machinery, are also on the claim. Should everything go smoothly with this new venture, the famous Gould & Curry company of the Pacific will certainly not be able to compete with them as regards returns. Labor can be obtained in Guiana for one-fourth of what it costs in California or Nevada. I have been in both those latter named countries, as well as in Australia, and I never saw there auriferous sand to equal in richness that of the sand of Guiana. Argentiferous ores abound all over Central America, but the surface specimens usually show them

to contain, by assay, an insufficiency of metal to pay for working, although the sinking of a shaft a few hundred feet would determine the correctness of the opinion of several geologists, who prognosticate great wealth under ground. From my own experience, I should say that the turning of the Surinam river above the first falls would cause a revolution in mining, as gold and black sand, almost equally mixed, can be seen in the bed of the river during the dry season. Near at hand to the New York and Surinam company's claim is the abandoned works of a company who worked two or three hundred years ago, and the indications now to be seen leave no doubt that they would have been justified in continuing, but for an earthquake, which destroyed their main shaft. My experience is, that when the bush is somewhat cleared away and burnt, to clear the miasmas, the country will be tolerably healthy. At present, swamp fever and ague are prevalent.

I propose to renew this subject from time to time.

Petroleum from Equador.

WE published last week an article setting forth the mineral wealth of this republic, and at the same time our advertisement of the invitation of the government to private parties, to send in proposals for leases of the petroleum lands, of Santa Elena. In the analyses of the oils of Equador and Pennsylvania, the amount of paraffine or lubricating oil in the latter was given at .95, when it should have been .05, that of the South American oil being .40. This renders the commercial value of the new oil considerably greater than that from Pennsylvania.

Deep Placer Mining in California.

THE period of depression in this branch of mining which succeeded the comparative exhaustion of the shallow placers and river and bar mining in the modern streams, has been followed, within the past year, by a season of renewed activity, caused in a measure by the success of many companies operating with the advantages of large capital, and by concentration of labor and the consolidation of large tracts of mining ground —the original owners of which, without such consolidation, could not afford the great expense of procuring outlets for their dirt and gravel by means of the construction of "bed rock" or drain tunnels—but principally by the invention and adoption of numerous appliances and improvements in mining, the most important of which are the improved hydraulic nozzles and the new drilling and boring machines, which will be fully described hereafter.

SHALLOW PLACERS.

This term is generally used to designate the deposits of auriferous earth found overlying the country rock to a depth of from a few inches to six or eight feet, and to distinguish such deposits from those found in the ancient streams and rivers and deposited over a vast extent of country to a depth of from one to three hundred feet, during some remote period, by causes which, with the light we have on the subject, can only be surmised. These are termed deep placers. It was in the shallow placers, at points where modern streams had denuded the banks, near the foot hills of the Sierra Nevada, that the first gold was discovered, and so prolific was the earth in the precious metal, that the product of gold, even by the primitive and rude methods of mining then in use, reached during the first five years after the discovery the sum of $180,000,000, nearly all of which was extracted from these placers.

The auriferous deposits which formed the early placers of California probably had their origin in two causes—the decomposition of rich quartz ledges cropping above the surface, and the scattering of the liberated gold over the adjacent country; as at Auburn and Ophir, in Placer county, and in certain parts of El Dorado county; and the breaking up at places by subterranean forces of the ancient channels of the antevolcanic period, and the consequent distribution of their contents by the modern streams, as in many of the southern and central mining counties. Instances of this can be observed along the courses of the Feather, Yuba, and the several forks of the American river. At many points, as at Grass Valley and Nevada, where natural basins exist, both the above causes have been in operation.

The impression which generally prevails, both in California and abroad, of the entire exhaustion of the shallow placers, is unfounded. River and bar mining are still extensively carried on in many parts of the country, and in some cases, particularly in the northern counties, with remunerative results. In the central portion of the State, particularly on the north fork of the American river, fair wages are yet made, though here this branch of mining has been to a great extent abandoned to the more patient though less skillful Chinese. In parts of El Dorado and other counties lying to the south, a large extent of pay-dirt, varying in depth from three to ten feet, exists among the foot-hills, but cannot be worked on account of the scarcity of water, although known to be sufficiently rich to largely compensate any company that would incur the expense of bringing water to the ground. It is now contemplated to bring water to several such points in these counties, and it is not improbable that they may again see something of their former prosperity.

DEEP PLACERS.

The class of "diggings" known by this term embrace the ancient channels found throughout the State, from Plumas to Mariposa county—in many cases, as in Butte and Tuolumne counties, covered with lava—and the immense detrital deposits of the northern and central region which are worked by the hydraulic system. Of the extent of this latter class we can form no intelligent estimate until the completion of the work now being carried on under the auspices of the State Geological Survey; but we know they cover a great part of the country lying west of the main range of the Sierras and between the head-waters of the Feather and South Fork of the American river. This includes an area one hundred miles in length by forty miles in breadth, and embraces parts of the counties of Plumas, Butte, Sierra, Yuba, Nevada, Placer, and a small portion of El Dorado. These deposits owe their origin to glacial or aqueous action of the geological period preceding the outbreak of the volcanoes of the Sierra Nevada and the upheaval of the coast range. When these great changes in the topography of the country took place, the detritus of the more elevated portion was covered with streams of lava flowing from east to west for a distance of from twenty to thirty miles from the craters. The waters, finding new channels, which run generally at right angles to the ancient streams, formed the present river system of the higher Sierras. The consequence was the denudation, breaking up and distribution of the ancient channels, where not protected by overlying crusts of lava, thus releasing from the storehouse of ages the golden sands which attracted hither the adventurous of all nations.

During a period of several years after the discovery of gold, the existence of the precious metals otherwise than in quartz or shallow diggings, was unsuspected. The early miners, lacking the benefits of observation and experience, in vain followed up the modern streams to their fountain heads, in the delusive hope of finding the "source of the gold." In no case was the "color" found above those points where subsequent examination revealed the breakage of the old channel system, or slides from under the lava crust, except at some points where unwashed gold was found in small quantities in the proximity of decomposed ledges of quartz. Subsequent exploration at these slides, and in gulches and ravines where the lava had been denuded, revealed the existence of ancient river beds at elevations of from one hundred to one thousand feet above the present water level. These discoveries led to the construction of the great system of mining ditches which, taking the waters of the streams from their heads, distributed them over the immense extent of ground worked now by the hydraulic process. By means of the facilities enjoyed from the use of abundant supplies of water, many points on the detrital deposits which were favorably situated for fall or outlet were worked, and hydraulic mining became for years the most remunerative branch of the business. In the course of several years of such extensive washings, however, the streams became filled and clogged with "tailings," which accumulated in such proportions as to effectually choke up all outlet, except for the brief season following the rains of winter, when the great volume of water would carry off a small portion of the accumulated tailings, and admit of a few brief "runs." Then they became more limited, season after season, until this branch of mining was effectually stopped in some of the richest localities.

The washing of the surface dirt to a depth of from 100 to 200 feet revealed the presence of a hard white or reddish cement, composed principally of pebbles and boulders of quartz and metamorphic rock, dirt and sand, but not yielding to the action of water, as then used, in streams of from 1½ to 2½ inches in diameter. Through these strata of cemented gravel prospecting shafts were sunk to the bed rock, leading to the discovery at many places of a layer of blue cement, composed of like material, and varying in thickness, in different localities, from three to ten feet. This layer, which often proved fabulously rich, was compact and firmly cemented by chemical agency and great pressure, and required the use of powder and drills for its extraction, and of heavy stamps for crushing. These discoveries gave a fresh impetus to mining, and resulted in the construction of bed-rock tunnels for the extraction of the cement from the river beds and the drainage of the ground. Many of these tunnels, as in Tuolumne, Butte, and near Forest Hill, in Placer county, were run thousands of feet under the lava, and through the rim-rock of the ancient channels. These enterprises were, however, not uniformly remunerative, for though the channel was generally found, the tunnels, which had been commenced and constructed without preliminary surveys, were often found to enter the channel above the bed of the stream, thus rendering them useless for extensive exploration and compelling their final abandonment. Thus, various obstacles had a discouraging effect upon the mining interest, and were followed by a period of depression lasting several years, during which the discovery of gold on Frazer and Salmon Rivers, and of the silver lodes of Washoe, occurred—events which nearly depopulated the mining counties.

CAUSES OF DEPRESSION OF PLACER MINING.

The causes for the inactivity, in past years, of this branch of mining may be briefly summed up as follows:

1st. The injudicious system of locations permitted under early mining laws and regulations, through the ignorance of the miners of the character, extent and depth of the detrital deposits. These locations were generally made in claims of 100 feet frontage, running back to the centre or backbone of the nearest ridge, regardless of the course of the deposit, such claims being too small to justify the expenditure by individual owners of the large sums necessary to construct tunnels for outlet and drainage.

2d. The filling and choking up with tailings, after a few seasons of washing, of the ravines, gulches and rivers which served as outlet for the ground, thus preventing the maintainance of flumes of sufficient length and grade to disintegrate the hard cement found underlying the top dirt, and rendering imperative the construction of long tunnels to the nearest deep stream, requiring in some cases years of labor and disbursement, without immediate returns, of large sums of money.

3d. The ignorance of the people and of capitalists of the unbounded mineral resources of their own State; the sudden and unhealthy excitement following the discovery of gold in British Columbia and silver in Nevada; and the efforts of a portion of the press of California, in the interest of land speculators, to "write up" agriculture at the expense of mining.

4th. The uncertain tenure of mining ground under local mining regulations, which differed in every district, and afford no adequate protection to the purchaser of mining ground unless he remained in actual possession.

THE GOLD YIELD OF CALIFORNIA.

The effect of this stagnation in mining enterprises may be traced in the following statements (compiled from tables published in the *Commercial Herald and Market Review* of San Francisco) of the receipts of uncoined treasure at San Francisco, from 1865 to 1869:—

California.	1865.	1866.	1867.	1868.	1869.
Nthrn Mines..	$36,649,337	$35,192,755	$37,578,627	$36,429,262	$29,905,449
Sthrn Mines..	5,108,413	4,106,975	3,013,356	2,888,781	2,567,402
Total...	$41,757,750	$39,299,730	$40,591,983	$39,318,043	$32,472,851

The above table embraces only the gold receipts, and includes the product of the quartz ledges, as there are no reliable data for making separate estimates of the yield of quartz and placer mines. It will thus be seen that the gold product from both these sources reached its lowest point during the year 1869.

The year 1870 may be marked as the beginning of a new era of mining in California, indicating an increased yield for the future which promises to continue for many years, and it is not improbable that the gold product for the next ten years may be brought up to an average of $40,000,000 per annum. At the date of writing (Nov., 1870) no accurate estimate can be made of the receipts of gold from the California mines for 1870, as no separate records are kept at the San Francisco Mint of treasure receipts—a large proportion of such receipts being in the shape of refined bars from the gold refineries. The receipts of gold dust at the Mint have been principally from small companies working on the deep placers, and from river and bar mining, as most of the large companies have recently erected their own retorting and smelting furnaces, from which they send their crude bullion to the refiners, who keep no record of the locality from which the gold is shipped.

The following table of comparison of coinage at the San Francisco Mint for the first nine months of the past four years, will bear evidence of the increased gold product for 1870:—*

1867.	1868.	1869.	1870.
$13,465,535	$9,933,000	$9,586,500	$14,839,000

It is anticipated that the coinage for 1870 will exceed that of any year since 1859, and it must be remembered that the past season, on account of its dryness, has not been an auspicious one for mining operations.

Floating Docks.

THE following is an abstract of a paper read by Mr. G. B. RENNIE before the English Institution of Civil Engineers, taken from our English contemporary, *Engineering*:

After touching upon the various modes formerly adopted of cleaning and repairing the bottoms of ships, the author referred more particularly to the wooden floating docks introduced by Mr. GILBERT, in the United States of America, and to that made by him, in 1858, at Venice, for the Austrian Naval Arsenal of Pola, in which the two largest ships that had been docked were the Kaiser, of 3225 tons, and the Ferdinand Max, ironclad, of 3066 tons. The Messrs. RENNIE having been called upon by the Spanish Government to make a proposition for furnishing a floating dock for Cartagena, capable of raising the class of ironclad ships then about to be added to the Spanish Navy, having a weight of from 5000 tons to 6000 tons, which were represented by the Numancia and the Vittoria types, they proposed a dock somewhat similar to that constructed at Venice, but of iron instead of wood, with certain important modifications. In the wooden structure, in order to sink the dock sufficiently, it was not only necessary to allow water to run into the lower chambers, but water had to be forced into the top compartments at the sides, to overcome the buoyancy of the material; while in the iron structure provision had to be made to prevent the dock sinking when the lower chambers were filled with water. To accomplish this, the upper part of the side walls was divided into compartments, forming permanent air chambers, or floats, of a capacity sufficient to maintain the decks of the side walls from six feet to eight feet above the water level. The author laid stress on the importance of these for the safety of iron floating docks. As an instance of the success of the Cartagena Dock, he mentioned that the Numancia, of 5600 tons weight, had been supported on it for a period of eighty days. A list was then given of wood and iron floating docks which had come under the author's notice, all of which were of rectangular shaped sections, with the exception of the Bermuda, which was of a U section. This latter form required gates, or caissons, to close in the ends, which were not necessary in the rectangular section on account of the bottom and the keel of the ship being entirely raised out of the water. Less water had also to be discharged with the rectangular form, and the amount of pumping varied as the weight of the ship; whilst in the other, or U form, the smaller the ship the larger the volume of water to be discharged. The depth of the basement, or lifting chamber, of a floating dock, like that at Cartagena, mainly depended on the lifting power required. The thickness of the plates of the shell was ⅝ inch and 1¼ inch in the centre part. For such a vessel as the Numancia, weigh-

* It is true that the statement of coinage embraces the receipts of bullion from all sources, silver and gold, but in view of the diminished receipts of treasure for the past year from the Comstock Lode, White Pine, and the Northern Coast, we are justified in crediting the gold mines of California with the increased productiveness manifested in the above statement.

ing 5600 tons, the strain was estimated to be 1.32 ton per square inch, and for a vessel weighing twenty tons per lineal foot 1.5 ton per square inch.

Of the different plans of conveying docks to their destination, it was remarked that—that of Pola was built at and towed from Venice, that of Havannah from New Orleans, that of Alexandria from France, and the Bermuda from the Thames; while those of Cartagena, Ferrol, etc., were sent out in pieces and erected at the respective ports.

The necessary repairs, painting, or cleaning, might be performed by careening, beaching where there was sufficient rise and fall of tide, raising the submerged part out of water by pontoons, or by floating the dock into a shallow basin; this latter plan being the one adopted at Cartagena.

The dock at Cartagena was 324 feet in length, 105 feet in breadth, and 48 feet in height outside; the dimensions of the dock at Ferrol were 350 feet, 105 feet, and 50 feet, respectively. After giving a detailed account of the number of chambers into which the docks were divided, and the scantlings of the materials employed in their construction, the pumping machinery was described, and it was stated that it had been designed so as to be as much concentrated as possible, and thus be capable of being placed under the control of one man. The arrangement adopted was that of a pair of horizontal engines, working two pairs of lift pumps, to draw water from a common pipe, communicating with all the chambers. On the ends of these pipes were fixed the inlet sluices for filling the chambers, and on the sides smaller sluices and pipes in communication with each chamber, so that by opening all the sluices the chambers were filled, and on shutting the inlet sluices one or any number of chambers might be discharged. Thus the whole engine power might be employed in pumping out any one compartment, if it was found desirable to do so, in order to balance or level the deck. A detailed description of the engines, pumps, and sluices was then given.

The shallow basin or dock receiver, with its three lines of ways or slips, occupied the site of some old timber ponds. The basin was of a uniform depth of 16 feet 6 inches from the top of the quay wall, and the depth of water was 12 feet 3 inches. The entrance was 126 feet wide. The basin was 382 feet long on the north side, and 345 feet on the south side. The end was curved, the chord of which was 200 feet. From this end ran three lines of horizontal ways or slips, radiating to a centre. Each was 725 feet long and 45 feet broad, and each was laid with four lines of timber ways, intended to receive vessels after they had been raised by the floating dock. It was estimated that six vessels might be building, or be under repair, at the same time, besides one on the floating dock. The foundations and masonry were then described, and it was mentioned that the caissou for closing the entrance of the basin was similar to that made by the Messrs. RENNIE for Pola.

After the basin and dock were completed, water was let into the receiving basin, when the draught of water of the dock was found to be 4 feet 7 inches, giving a displacement of 4400 tons as the weight of the dock complete. The dock was afterwards taken into the arsenal basin, and lifted vessels of various sizes, the ironclad Numancia being the largest. The draught of water of the dock with the Numancia was found to be 11 feet 3 inches, the dimensions of the ship being—length between the perpendiculars, 316 feet; extreme beam, 57 feet, and displacement at the load draught, 7420 tons.

The operation in docking this and other vessels had proved the dock to be in every way efficient, and from the arrangement of the distributing valves, it could be managed with facility, either in sinking or in lifting.

The *personnel* of the dock consisted of one chief engineer, one master boiler-maker, and, with other assistants, amounted to eighteen men in all; and with this staff everything went on regularly and without trouble.

New Process for Treating Sulphuretted Copper Ores.

THE *Mechanics' Magazine* publishes the following: "Mr. C. M. TESSIE-DU-MOTAY, of Paris, the eminent French chemist, has just completed a new process for the treatment of the sulphuretted minerals of copper, commonly called pyrites. The process comprises an entire change in the operations at present in use for the roasting of these minerals, which is performed when the mineral is in a state of fusion by means of air or oxygen, which at the same time produces a mechanical stirring of the materials which are held in an apparatus specially arranged for this operation. After being reduced to the melted state in a cupola, the melted mineral is led through a tube or passage, into the roasting and stirring apparatus. This apparatus is chiefly composed of two chambers or capacities, communicating with one another by a conduit. A number of pipes lead into the midst of the melted metal contained in the chambers, and in the condnit jets of air or oxygen, and, if necessary, simultaneously mixed jets of air and combustible gases. Orifices are formed at the top of each of the chambers to permit the escape of the gases, which can be closed alternately, and passages at the upper part of each of the two capacities, leading air under pressure regulated by cocks permit the production of a pressure upon the melted mass, sometimes on one side and sometimes on the other, which forces it through the conduit, uniting them into one or the other of the capacities alternately. This alternate backward and forward movement thus causes a regular mechanical stirring, in which the movement imparted to the mass, as well as the differences in density of the different portions of the melted mass, act concurrently, in order to produce an intimate mixture, and to facilitate the chemical reactions produced by the air, the oxygen, or gases. The outflow is effected through an aperture at the lowest part of the conduit, uniting the two capacities. The matte thus obtained is again melted in a cupola, then re-roasted in the same apparatus; and these operations are repeated as many times as found necessary. An addition of silica is also employed in convenient quantities, according to the nature of the mineral, in order to scorify the oxide of iron produced during the roasting process. Mattes very rich in copper are thus obtained, and it is only necessary now to reduce and refine them."

This process, although it may be new in France and England, is not so in this country. Over a year ago Mr. A. EILERS, M. E., of this city, then managing copper-smelting works in Virginia, explained a new process of his to us, which is founded on the same principles, applied in the foregoing, but goes much further. The ores he had to smelt were sulphurets of iron and copper, containing only six per cent. of copper. In order to save fuel and repeated manipulation he proposed to roast his ores once in open heaps, in order to produce a more liquid mass in the subsequent smelting than could be produced by smelting without any roasting whatever (his ores containing much quartz and talc). He would thus get rid of a great deal of slag before tapping the poor matte into an apparatus very much like a Bessemer converter. This was to be stationary, and the top could be closed partly or entirely, in order to let the air, to be introduced through many tuyères into the melted matte below, act on the oxidizable metals under pressure, if necessary. The apparatus was furthermore provided, at a height where the slag would form on top of the matte, with an opening which could be closed with stubbe, and with a tap-hole in the bottom of the apparatus, communicating with a small reverberatory by its side. In the oxidizing apparatus the matte would be concentrated as high as could be done without producing black copper. The slag would be let off from time to time, and finally the rich matte would be tapped into the reverberatory, which was heated by the gases from generators. In the bottom and sides of this reverberatory tuyères were also arranged, which would lead the blast into the rich matte, thus facilitating and shortening the first period of the refining process. The later parts of this process, the cooking and poling, to be carried out as usual.

The great saving in this process is apparent. It saves not only the difficult roasting of mattes in the common way, but loses no heat, by transferring the products of one apparatus hot into the next one, and thus condensing processes formerly requiring months for their execution, into a few hours.

OFFICIAL LIST OF PATENTS.

Issued by the United States Patent Office.

FOR THE WEEK ENDING JANUARY 31, 1871.—Continued.

Reported Officially for the Engineering and Mining Journal.

SCHEDULE OF PATENT OFFICE FEES

On each caveat	$10
On filing each application for a Patent (seventeen years)	15
On issuing each original Patent	20
On appeal to Commissioner of Patents	20
On application for Reissue	30
On application for Extension of Patent	50
On granting the Extension	50
On filing a Disclaimer	10
On an application for Design (three and a half years)	10
On an application for Design (seven years)	10
On an application for Design (fourteen years)	30

Registration fees for TRADE MARKS under the new law; for thirty years 25

Citizens of Canada can now obtain Patents in the United States upon the same terms as Citizens of other Countries.

For copy of Claim of any Patent issued within 30 years $1

A sketch from the model or drawing, relating to such portion of a machine as the Claim covers, from upward, but usually at the price above named $1

The full Specifications of any patent issued since Nov. 20, 1866, at which time the Patent Office commenced printing them $1 25

Official Copies of Drawings of any patent issued since 1836, we can supply at a reasonable cost, the price depending upon the amount of labor involved and the number of views.

Full information, as to price of drawings, in each case may be had by addressing

WESTERN & CO.,
No. 37 Park Row, New York.
CHARLES ROGERS, Solicitor.

111,484.—WRINGING-MACHINE.—Albert H. Spencer, Providence, R. I.

111,485.—BASE-BURNING STOVE.—Stephen Spoor, Phelps, N. Y.

111,486.—MANUFACTURE OF ILLUMINATING GAS.—Ira N. Stanley, Brooklyn, N. Y.

111,487.—UMBRELLA.—Nicholas Starr, Homer, N. Y.

111,488.—ELECTRO-MAGNETIC SEWING-MACHINE.—George Stevens and Joshua Hendy, San Francisco, Cal.

111,489.—GUARD-CHAIN FOR BRACELETS.—George D. Stevens, New York, N. Y.

111,490.—CHURN.—William W. Stillwell, Oxford, Wis.

111,491.—CARRIAGE BODY.—Chauncey Thomas, Boston, Mass.

111,492.—VEHICLE.—Chauncey Thomas, Boston, Mass.

111,493.—STOVE-GRATE.—William S. Thomas, Kendallville, Ind.

111,494.—CHAIR.—Cyrus Tucker, Terre Haute, Ind.

111,495.—TRUSS.—Cornelius C. E. Van Alstine, New Haven, Conn.

111,496.—MACHINE FOR PREPARING WOOD PULP.—Michael Waissnix and Alois Waissnix, Reichenaud, and Carl A. Specker, Vienna, Austria.

111,497.—FLY-EXTERMINATOR.—Amasa K. Walker, Hampden, Me.

111,498.—MODE OF LAYING PIPES ACROSS RIVERS.—John Frothingham Ward, Jersey City, N. J

111,499.—DOOR-LOCK.—John Welsh, Canton, Ohio.

111,500.—REPEATING FIRE-ARM.—Luke Wheelock, New Haven, Conn., assignor to the Winchester Repeating Arms Company, same place.

111,501.—BOLT-REEL.—Benjamin Clayton White, Des Moines, Iowa.

111,502.—HARNESS SADDLE-TREE.—Philip H. Wiedersum, New York, N. Y.

111,503.—MECHANICAL MOVEMENT.—Jacob Woolf, Burr Oak, Mich.

111,504.—MANUFACTURE OF STEEL, STEEL IRON, AND HOMOGENEOUS OR CRYSTALLINE IRON.—James D. Whelpley and Jacob J. Storer, Boston, Mass.

WEEK ENDING FEBRUARY 7, 1871.

111,505.—COFFEE-POT.—Niven Agnew, Delaware, Canada.

111,506.—ADJUSTABLE SHUTTLE-BINDER.—Nicholas J. Allen and James C. Moody, Brunswick, Me.

111,507.—SPARK-ARRESTER.—Thomas A. Andrews, Jr., Philadelphia, Pa.

111,508.—FENCE.—Hugh M. Barber, Franklin Station, Ohio.

111,509.—FAUCET.—Thomas W. Bartholomew, New York, N. Y.

111,510.—CORN-PLANTER.—Leander Becker, Jackson Township, Pa.

111,511.—APPARATUS FOR OILING FELLIES, SPOKES, &c.—Priscus E. Bomby, Lepy, Pa.

111,512.—LAMP FOR COAL-OIL STOVES.—John Bowles, Augusta, Ga., assignor to himself and Samuel Bard, same place.

111,513.—OSCILLATING BALANCE STEAM-VALVE.—John C. Bromley, Rock Island, Ill.

111,514.—PAPER-COLLAR BOX.—Lee Churchill, Troy, N. Y.

111,515.—HINGE FOR GATES.—Charles B. Clark, Buffalo, N. Y.

111,516.—BOILER.—Levi H. Colborne and David H. Lowe, New York, N. Y.

111,517.—COOKING-STOVE.—John B. Crowley Addis E. Chamberlain, Cincinnati, Ohio, assignors to Chamberlain & Co., same place.

111,518.—SELF-CLOSING COCK.—William Dalziel, New York, N. Y.

111,519.—CLOTHES-DRIER.—Alfred Day, Skowhegan, assignor of one-half his right to Francis Lyford, Augusta, Me.

111,520.—ASPHALT CEMENT FOR PAVEMENTS, DRAIN-PIPES, &c.—Edward J. De Smedt, New York, N. J.

111,521, antedated January 28, 1871.—MAIL-BAG FASTENING.—D. Franklin Dodge, Louisville, N. Y.

111,522.—CARRIAGE-CURTAIN KNOB.—William B. Douglass, Newark, N. J., assignor to Frederick Baumgarther, Brooklyn, N. Y.

111,523.—MACHINE FOR WARPING YARN.—George Draper, Hopedale, Mass.

111,524.—SASH-HOLDER.—Henry W. Drott, Cumberland, Md.

111,525.—FUNNEL.—Lester P. Edwards, Hamilton, Pa.

111,526.—WATER-HEATER FOR STEAM BOILERS.—David C. G. Field, Lowell, Mass.

111,527.—STEAM GENERATOR.—Loyal C. Field, Galesburg, Ill.

111,528, antedated January 25, 1871.—BEDSTEAD FASTENING.—Sebastian Goetz, Reed's Mills, Ohio

111,529.—INVERTIBLE TROUGH.—Francis J. Goldsmith, Concord, Ohio, assignor of one-half his right to Peter F. Young, Painesville, Ohio.

111,530.—FEED-GRINDER.—Myron Gore, Ill.

111,531.—LAMP.—Franklin T. Grimes, Liberty, Mo.

111,532.—MACHINE FOR BORING POSTS.—Jesse R. Group, Idaville, Pa.

111,533.—LEATHER-PUNCHING AND CUTTING-MACHINE.—Emery E Hardy and Napoleon Lubrul, Joliet, Ill.

111,534.—CARTRIDGE-SHELL EJECTOR FOR REVOLVING FIRE-ARMS. Gilbert H. Harrington, Worcester, Mass.

111,535.—WATER-PROOF PIANO COVER.—Henry F. Herkner, New York, and Jared W. Fost, Brooklyn, N. Y.

111,536.—HYDRAULIC APPARATUS.—George H. Herring, Durand, Ill.

111,537.—ÆOLIAN CHIMING BELL.—Heinrich Herrmann, New York, N. Y.

111,538, antedated January 30, 1871.—DOUBLE-ACTING ROTARY ENGINE.—James T. Herron, Atlanta, Ga.

111,539, antedated February 1, 1871.—APPARATUS FOR TRANSMITTING POWER AND CHANGING THE SPEED.—Spencer Hiat, Clayton, Ind.

111,540.—SCAFFOLD.—Samuel Hollabaugh and Thomas W. Letts, Mount Union, Pa.

111,541, antedated January 26, 1871.—SHOES FOR THRASHERS.—Dennis W. Hollihan, San Francisco, Cal.

111,542.—AUTOMATIC STEAM WATER ELEVATOR.—Charles Houghton, Roxbury, Boston, Mass.

111,543.—WHEEL AND AXLE FOR RAILWAY CARS.—Wescom Hudgin, Athens, Ga.

111,544.—CLOVER-HARVESTER.—John W. Hull and Albert G. Stiffler, Alquina Ind.

111,545.—FLOUR-SIFTER.—Curtis Huntley, Lowell, Mass.

111,546.—STEERING APPARATUS.—Edward Augustus Inglefield, 10 Groves End Road, St. John's Wood, England.

111,547.—MODE OF FASTENING HUB-BAND, &c.—James Ives, Mount Carmel, Conn.

111,548.—BATTER-POT.—Edwin A. Jeffery, New York, N. Y.

111,549.—MANUFACTURE OF RUBBER FLOOR-CLOTH, &c.—Henry W. Joslin, Jersey City, N. J.

111,550.—COUPLING FOR SHAFTS FOR MILLS.—William Kean, Chicago, Ill.

111,551.—PREPARATION OF PLATINUM FOR FILLING TEETH.—Edward G. Kearsing and Leonzo Kearsing, Spring Valley, N. Y

111,552.—BOILER-TUBE PLUG.—Thomas La Blanc, Philadelphia, Pa.

111,553.—CARPENTERS' WORK-BENCH.—Robert C. Love, Augusta, Me.

111,554.—SPRING BED.—Nicholas Mason, Lincoln, Mass.

111,555.—CHURN.—James McBride, Ithaca, N. Y.

111,556.—THILL-COUPLING.—William B. Meloney, Smyrna, Del.

111,557.—HARVESTER.—James Moran, Auburn, N. Y., and Casper D. Wallace, Corry, Pa., assignors to themselves and Hiram K. Needham, St. Louis, Mo.

111,558.—TONGUE FOR CHILD'S CARRIAGE.—Edwin A. Morse, Rutland, Vt.

111,559.—MAT.—Peter W. Neefus, New York, N. Y.

111,560.—FLOOR-CLAMP.—David Nevin, Georgetown, Colorado Territory.

111,561.—INVALID BEDSTEAD.—John H. Oerter, New York, N. Y.

111,562.—CHURN.—William Parks, Meadville, Pa.

111,563.—CLOTHES-DRIER.—Asahel H. Patch, Hamilton, Mass.

111,564.—RATCHET COUPLING FOR BARGES, &c.—William W. Patterson and Edmond Bishop, Pittsburg, Pa.

111,565.—ARTIFICIAL FUEL.—Benjamin F. Penny, Rochester, N. Y., assignor to Thaddeus B. Curtis, New York City.

111,566.—FOUNTAIN BLACKING BRUSH.—Albert D. Pentz, New York, N. Y.

111,567.—LATCH-LOCK.—Nicholas Petré, New York, N. Y.

111,568.—WINE-SIRUP AND BEVERAGE.—Alvin Davis Puffer, Boston, Mass.

111,569.—KILN FOR DRYING MALT.—John A. Remer, New York, N. Y., assignor to himself and Henry Assenheimer, same place.

111,570.—PORTABLE SWING.—Daniel M. Reynolds, Chicago, Ill.

111,571, antedated January 23, 1871.—POTATO-DIGGER.—Richard B. Robbins, Adrian, Mich.

111,572.—MACHINE FOR THREADING SCREWS.—Daniel M. Robertson, East Boston, and Jason A. Bidwell, Boston Mass.

111,573.—FERRULE.—William Henry Rodden, Toronto, Canada.

111,574.—THILL-COUPLING.—Lewis S. Rowe, Derby Line, Vt., assignor to himself and U. T. Sheaf.

111,575.—RIVETING-MACHINE.—William Sellers, Philadelphia, Pa.

111,576.—FEATHER-RENOVATOR.—James T. Sheldon, Chicopee, Mass.

111,577.—PORTABLE BOOK-HOLDER.—Calvin W. Sherwood, Chicago, Ill.

111,578.—PORTABLE FENCE.—Hector Sinclair, New York, N. Y.

111,479.—PAPER FOR USE IN THE BOTTOMS OF BIRD CAGES.—Jasper H. Singer, New York, N. Y.

111,580.—BOILER FURNACE.—Le Grand Skinner, Chittenango, N. Y.

111,581.—PRINTING PRESS.—Earle H. Smith, Bergen, N. J.

111,582.—PULLEY.—Scott A. Smith, Philadelphia, Pa., assignor to Cresson & Smith, same place.

111,583.—TANNING.—William C. Stone, Derby Line, Vt., assignor to himself and William S. Foster.

111,584.—BRAKE FOR RAILWAY CARS.—Charles W. Tierney, Altoona, Pa.

111,585.—WASH-BOARD.—Westley Todd, Allegheny, Pa.

111,586.—PRISON LOCK.—Henry R. Towne, Stamford, Conn.

111,587.—PERMUTATION LOCK.—Henry R. Towne, Stamford, Conn.

111,588.—FLUTING-MACHINE.—Theodore M. Tucker, Newark, N. J.

111,589.—STOVE DRUM.—Willard Twitchell, Syracuse, N. Y.

111,590, antedated January 26, 1871.—LUBRICATOR FOR LOOSE PULLEYS.—Stephen Ustick, Philadelphia, Pa.

111,591, antedated February 4, 1871.—RAILWAY CAR BRAKE.—John E. Weaver, Lancaster, Pa.

111,592.—CANDY-CUTTING MACHINE.—Christopher Wentz, Albert Green, and Orlando P. Connor, Trenton, N. J.

111,593.—APPARATUS FOR DELIVERING GRAIN, ORES, &c., INTO GRINDING-MILLS.—James Davenport Whelpley and Jacob Jones Storer Boston, Mass.

111,594.—FEED-CUTTER—John R. Whittemore, Chicopee Falls, Mass.
111,595.—LOOM-PICKING MOTION.—Henry A. Whitten and Elijah D. Gove, Holyoke, Mass.
111,596, antedated January 23, 1871.—DROP-TUBE STEAM-GENERATOR.—S. Lloyd Wiegand, Philadelphia, Pa.
111,597, antedated January 25, 1871.—VELOCIPEDE.—William L. Williams, New York, N. Y.
111,598.—STEAM HEATER.—Joseph L. Winslow, Portland, Me.
111,599.—VESSEL FOR HOLDING OIL.—Arthur T. Woodward, New York, N. Y.
111,600.—HYDRAULIC CEMENT.—Samuel Adams, Michigan Bluff, Cal.
111,601.—WATER-WHEEL.—John P. Allen, Springfield, Ohio.
111,602.—COATING BRICK, WOOD, AND OTHER SURFACES ON WALLS, &c.—Edward E. Alvord, Salt River, Mich.
111,603.—DRIVING-POWER FOR LOCOMOTIVES.—William D. Arnett, Denver, Colorado Territory.
111,604.—SAND-SIFTER.—William Bailey, Friendship, N. Y.
111,605.—SCOOP AND SIFTER.—Joseph Baker, Trenton, Canada.
111,606.—FEATHER RENOVATOR.—James A. Bell, Tyrone, Pa., assignor to himself and Henry Z. Stetler, same place.
111,607.—FRUIT-JAR.—Melville R. Bissell, Kalamazoo, Mich., assignor to Salmon B. Rowley, same place.
111,608.—FLOWER-STAND.—Elijah D. Castelow, Meriden, Conn.
111,609.—ALCOHOL STILL.—George Clarkson, Elgin, Ill., assignor to himself, Samuel D. Wilder, and Albert Sherwin, same place.
110,610.—STAIRWAY.—Charles Saunders Close, Philadelphia, Pa.
111,611.—MANUFACTURE OF STRAW BOARD FOR THE CONSTRUCTION OF BUILDINGS.—Judd M. Cobb, Beloit, Wis.
111,612.—APPARATUS FOR CLEANING SULPHURETS AND OTHER ORES.—Charles C. Coleman, San Francisco, Cal.
111,613.—BOOT-JACK.—Ezra Coleman, San Francisco, Cal.
111,614.—APPARATUS FOR FEEDING PULVERIZED FUEL TO FURNACES.—Thomas Russell Crampton, Westminster, London, Great Britain.
111,615.—APPARATUS FOR DISTRIBUTING AND FEEDING POWDERED FUEL TO FURNACES.—Thomas Russell Crampton, Westminster, London, Great Britain.
111,616.—FURNACE FOR BURNING PULVERIZED FUEL.—Thomas Russell Crampton, Westminster, London, Great Britain.
111,617.—SUSPENDER.—John W. Dayton, Waterbury, Conn.
111,618.—HAND-VISE.—James W. Devlin, Yonkers, N. Y.
111,619.—SAW.—Henry Disston and Thomas Oates Hill, Philadelphia, Pa., assignors to Henry Disston & Son, same place.
111,620.—DEVICE FOR ENLARGING WELLS.—Thomas Donnelly, Pittsburg, Pa.
111,621.—VALLE AND COCK.—Isidore Dreyfus, New York, N. Y.
111,622.—HEATING STOVE.—Samuel H. Emery, Jr., and Chauncey H. Castle, Quincy, Ill.
111,623.—SIFTER AND STRAINER.—Lyman Fay, Fall River, Mass.
111,624.—WATER METER.—Thomas B. Fogarty, Brooklyn, N.Y.
111,625.—BOOT AND SHOE FASTENING.—Franklin D. Ford, New Bedford, Mass.
111,626.—GATE-LATCH.—William Fosket, Meriden, Conn., assignor to Charles Parker, same place.
111,627.—WALKING-CULTIVATOR.—Andrew Friberg, Moline, Ill.
111,628.—SAFETY DEVICE FOR HATCHWAYS.—Alexander Fries, Cincinnati, Ohio.
111,629.—BRICK MACHINE.—Benjamin M. Gard, Urbana, Ohio, and Emery R. Gard, Chicago, assignors to United States Brick Machine Company, Chicago, Ill.
111,630.—WATER WHEEL.—James Gardner, South Lee, Mass.
111,631.—CLOD-FENDER.—Robert T. Gillespie, Millport, Ohio.
111,632.—PLANING MACHINE.—James Goodrich and Henry J. Colburn, Fitchburg, Mass.
111,633.—HARVESTER.—William F. Goodwin, Metuchen, N. J.
111,634.—HORSE POWER.—William F. Goodwin, Metuchen, N. J.
111,635.—HAIR PIN.—Charles M. Gormly, Pittsburg, Pa.
111,636.—IRON ABUTMENT FOR BRIDGES.—Jacob S. Goshorn, Fort Wayne, Ind.
111,637.—DEVICE FOR SECURING CORKS IN BOTTLES.—Samuel L. Gouverneur, Frederick City, Md.
111,638.—APPARATUS FOR THE MANUFACTURE OF CONFECTIONERY.—William F. Gossard, Boston, Mass.
111,639.—SECTIONAL STEAM BOILER.—James S. Griffith and Charles E. Emery, New York, N. Y.
111,640.—WINE AND CIDER PRESS.—Thomas W. Grinter, Russellville, Ky., assignor to James L. Haven, Cincinnati, Ohio.
111,641.—BRIDGE FOR SUPPORTING SHAFT-DRILLING MACHINES.—Joseph P. Griscom, Port Carbon, and John Fritz, Mahony Plane, Pa.
111,642.—EXPLOSIVE COMPOUND.—Joseph Hafenegger, San Francisco, Cal.
111,643.—CAM FOR QUARTZ MILLS.—Oliver P. Hart, Logtown, Cal.
111,644.—STEAM ROAD WAGON.—Charles W. Hermance, Schuylersville, N. Y.
111,645.—PUMP.—Oliver Higgins, Napoleon, Ohio.
111,646.—SPRING BED BOTTOM.—Egbert B. Hill, Grand Rapids, Mich.
111,647.—TAP-WRENCH.—George W. Huntoon and Edwin Simonds, Lowell, Mass.
111,648.—AUGER.—William A. Ives, New Haven, Conn.
111,649.—BIT BRACE.—William A. Ives, New Haven, Conn.
111,650.—FEED-WATER APPARATUS.—James Kindel, Wilmington, Ohio.
111,651, antedated February 3, 1871.—PLOW.—Sampson B. King, Starkville, Ga.
111,652, antedated January 28, 1871.—ICE-CRUSHER.—Oliver B. Kinsey, Newark, N. J.
111,653.—PORTABLE STALL.—Daniel P. Leach and William F. Leach, Franklin, Ind.
111,654.—DYEING AND PRINTING TEXTILE FABRICS.—John Lightfoot, Lowe house near Burnley, England.
111,655.—MEDICAL COMPOUND.—Henry Lister, Houston, Texas.
111,656.—POTATO-DIGGER.—George C. Love, English Centre, Pa.
111,657.—COOKING STOVE.—Peter Low, Cleveland, Ohio.
111,658.—APPARATUS FOR EXTRACTING OIL FROM BONE DUST.—William W. Lucas, Cleveland, Ohio.
111,659, antedated January 28, 1871.—FAUCET.—John R. Mackay, Meriden, Conn
111,660.—SCAFFOLD.—Nicholas Martz, Lykens, Pa.
111,661.—MANUFACTURE OF PAPER, CORDAGE, TWINE, &c.—James H McConnell, Springfield, Ill.
111,662.—TRUSS BRIDGE.—John A. McKay, Auburn, Ind.
111,663.—TYPE-HOLDER.—William McNaughton, Chicago, Ill., assignor of one-half his right to John H. Trumbull, same place.
111,664.—VENT-PLUG.—Charles H. Miller and William Ascough, Buffalo, N. Y.
111,665—WAGON.—Alexander Moffitt, Washington, D. C.
111,666.—VAPOR-BURNER.—Thomas Moore, Bloomington, and James O'Donald, Clinton, Ill.
111,667.—DENTAL ENGINE.—James B. Morrison, St. Louis, Mo.
111,668.—DIE FOR FORGING, TRIMMING, AND SHAPING SPRING-CLIPS FOR CARRIAGES.—Francis B. Morse, Plantsville, Conn., assignor to H. D. Smith & Co., same place.
111,669.—FEEDING QUICKSILVER TO STAMPS AND AMALGAMATORS.—George C. Munson, Empire city, Colorado Territory.
111,670.—MEAT-CUTTER.—Hugh B. Murphy, Allegheny City, Pa.
111,671.—ANIMAL-HOISTING APPARATUS.—Jason Newton, Macengo Township, Mich.
111,672.—CLOCK-PENDULUM ROPE.—Russell W. Norton, New Haven, Conn.
111,673.—ANIMAL TRAP.—James C. Parrish, Petersburg, Pa.
111,674.—FEEDING DEVICE FOR CARDING AND OTHER PREPARING MACHINES.—Edward Pettitt, Manchester, England.
111,675.—COMBINED GRAIN-DRILL AND CORN-CULTIVATOR.—David B. Platt, Jeffersonville, Ind.
111,676.—GATE.—John Pool, Elizabeth City, N. C.
111,677.—GOVERNOR FOR STEAM ENGINES.—George F. Pottle, Boston, assignor to himself and Reuben K. Huntoon, Wakefield, Mass.
111,678.—SHUTTLE FOR SEWING-MACHINES.—George M. Pratt, Middletown, Conn.
111,679.—CAST-IRON BARREL.—Abel Putnam, Jr., Saratoga Springs, N. Y.
111,680.—WATER-COOLER.—Abel Putnam, Jr., Saratoga Springs.
111,681, antedated February 4, 1871.—PROPELLING APPARATUS FOR BOATS.—Joseph Repetti, Philadelphia, Pa.
111,682.—MEDICATED PLASTER.—Albert D. Richards, Somerville, Mass., assignor to Tufts, Grosvenor & Co.
111,683.—PEN-HOLDER.—Henry Roth, Virginia City, Nevada.
111,684.—BOX FOR PACKING AND TRANSPORTING SHEET METAL CANS.—Charles E. Russ, Boston, Mass.
111,685.—FERTILIZER DISTRIBUTER.—Christopher Salvo, Columbus, Ga., assignor to himself, Joseph C. Brewer, and Robert W. Mifford, same place.
111,686.—MACHINE FOR DEGERMINATING MALT.—Charles Sauter, New York, N. Y., assignor to himself and G. Schutz, Jersey City, N. J.
111,687.—CORN-PLANTER.—Levi Scofield, Watertown, Wis.
111,688.—ELECTROTYPE DIE OR MOLD FOR MOLDING PLASTIC MATERIALS.—David Scrymgeour, Foxborough, Mass.
111,689.—ROCK-DRILL.—Jacob Shelley, Mahanoy Township, Pa.
111,690.—SHIRT.—Solomon Sibley, Boston, Mass.
111,691.—HOT-BLAST STOVE FOR HEATING AIR, STEAM, &c.—Charles William Siemens and Edward Alfred Cowper, Westminster, and Charles Cochrane Ellowes Upper Gornal, England; said Siemens and Cochrane assign their right to said Cowper.
111,692, antedated February 4, 1871.—RAILROAD TICKET.—Joseph T. Smith, Louisville, Ky.
111,693.—SPRING-BOLT.—William E. Sparks, New Haven, Conn., assignor to Sargent & Co., same place.
111,694, antedated February 4, 1871.—DEVICE FOR REEFING AND FURLING SAILS.—William Spear, Cape Elizabeth, Me.
111,695.—CAR-COUPLING.—Laroy S. Starrett, Athol, Mass.
111,696.—BEE-HIVE.—Monroe J. Stearns, Galesville, Wis.
111,697.—FOUNTAIN.—Joseph Storer, Hammersmith, England.
111,698.—COOKING-STOVE.—David Stuart, Philadelphia, Pa.
111,699.—COMBINED REMOVABLE COCK AND FIXED SOCKET.—Cornelius Sullivan, Boston, Mass.
111,700.—SAND OR EMERY PAPER.—George Carpenter Taft, Worcester, Mass., assignor to himself and Augustus Ball Davis, Philadelphia, Pa.
111,701.—FILTER FOR CISTERNS.—Robert W. Thompson, Mansfield, Ohio.
111,702, antedated February 1 1871.—PAPER-CUTTING MACHINE.—William H. Topham, New York, N. Y.
111,703.—HUB FOR WHEELS.—James L. Van Wert, Tolland, Mass.
111,704.—MILLSTONE BAIL AND DRIVER.—Albert G. Waldo, Milwaukee, Wis.
111,705.—FURNACE FOR BURNING PULVERIZED FUEL UNDER STEAM BOILERS, EVAPORATORS, &c.—James D. Whelpley and Jacob J. Storer, Boston, Mass.
111,706, antedated January 28, 1871.—HAY AND COTTON PRESS.—Jacob Lewis White, Hernando, Miss.
111,707.—ELECTRO-MAGNETIC ALARM BELL.—Charles Williams, Jr., Somerville, and Jerome Redding, Charlestown, Mass.
111,708.—WHEEL FOR WHEELBARROWS.—George Withington, Lone City, Cal.
111,709.—MACHINE FOR CUTTING CORNSTALKS.—John Wood, Pella, Iowa.
111,710, antedated January 28, 1871.—HARNESS SNAP.—Alonzo B. Woodard, Alfred Centre, N. Y., and William Bruen, Newark, N. J.; said Bruen assigns his right to said Woodard.
111,711.—MEDICATED SMOKING TOBACCO.—Wesley A. Wright, Lynchburg, Va.
111,712.—TREATING SMOKING TOBACCO.—Wesley A. Wright, Lynchburg, Va.
111,713.—DEVICE FOR SAVING GOLD AMALGAM AND QUICKSILVER.—Oliver H. Young and Daniel J. Vaughn, Wisconsin Hill, Cal.
111,714.—Dated January 31, 1871.—PROPULSION OF CANAL BOATS.—Thomas Main, Green Point, N. Y.

DESIGNS.

4,252.—CULTIVATOR.—Augustus Adam, Sandwich, Ill., assignee of William A. Dryden and Cyrus E. Dryden.—Patent No. 67,173, dated July 30, 1867.
4,253.—MANUFACTURE OF ENAMELED BRACELETS.—Abiel Codding, Jr., North Attleborough, Mass.—Patent No. 91,604, dated June 22, 1869.
4,254.—COOKING STOVE.—Charles P. Geissenhaner, Pittsburg, Pa., assignor to Esek Bussey and Charles A. McLeod, Troy, N. Y.—Patent No, 32,764, dated July 9, 1861.
4,256.—VENTILATOR.—Melville E. Mead, Darien Depot, Conn.—Patent No. 90,180, dated May 18, 1869.
4,256.—SHAFT-COUPLING.—Silas C. Schofield, Chicago, Ill.—Patent No. 63,182, dated March 26, 1867.
4,257.—OVERSHOE.—Henry C. Tyer, Andover, Mass.—Patent No. 68,398, dated September 3, 1867; reissue No. 2,820, dated December 24, 1867.

DESIGNS.

4,623.—HEATER FOR MILK, &c.—George Sumner Albee, Hopkinton, Mass.
4,624.—CARPET-PATTERN.—John H. Bromley, Philadelphia, Pa., assignor to John Bromley & Sons, same place.
4,625.—LIQUOR-HOLDER.—James A. Dunworth and Frank Dunworth, New York, assignors to "Vidvard & Sheehan," New York, N. Y.
4,626.—TYPE.—Heinrich Flinsch, Frankfort, Prussia.
4,627.—TYPE.—Andrew Gilbert, Boston, Mass.
4,628.—SHOW-CASE.—Winfield S. Grove, Philadelphia, Pa., assignor to himself and Abraham B. Grove, same place.
4,629.—SHOW-CARD.—Charles S. Hall, Rochester, N. Y.
4,630.—MATCH-SAFE.—Albert D. Judd, New Haven, Conn.
4,631.—DOVETAIL.—J. Dwight Kellogg, Jr., Northampton, Mass.
4,632.—CARPET-PATTERN.—Hugh S. Kerr, Philadelphia, Pa., assignor to Israel Foster, same place.
4,633.—CARPET-PATTERN.—Hugh S. Kerr, Philadelphia, Pa., assignor to Israel Foster, same place.
4,634.—CHAIR.—Anton Kimbel, New York, N. Y.
4,635.—CHAIR.—Anton Kimbel, New York, N. Y.
4,636.—CARPET-PATTERN.—Christian J. Koch, Philadelphia, Pa., assignor to John Bromley & Sons, same place.
4,637.—SIEVE.—Robert J. Mann, Dallas City, Ill.
4,638.—DRAWER-PULL.—Julius E. Merriman, West Meriden, Conn., assignor to Foster, Merriam & Co., same place.
4,639.—OIL-CLOTH PATTERN.—James Paterson, Elizabeth, N. J., assignor to Thomas Potter, Son & Co.
4,640.—MOLD FOR LAGER-BEER GLASSES.—John P. Pears, Pittsburg, Pa.
4,641.—MOLD FOR LAGER-BEER GLASSES.—John P. Pears, Pittsburg, Pa.
4,642.—LEAD PENCIL.—Joseph Reckendorfer and Teile H. Muller, New York, N. Y., assignors to Joseph Reckendorfer.
4,643.—BRACELET.—Theron I. Smith, North Attleborough, Mass.
4,644.—BEACELET.—Theron I. Smith, North Attleborough, Mass.
4,645.—STOVE-PLATE.—Nicholas S. Vedder and Francis Ritchie, Troy, N. Y., assignors to Hicks & Wolfe, same place.

TRADE-MARKS.

148.—COMPOSITION OIL.—Butler & Haynes, Bangor, Me.
149.—SHOES, BROGANS, AND BOOTS.—Edward Francis Jones, Farmington, N. H.
150.—SUGAR, SIRUP, AND MOLASSES.—William Moller & Sons, New York, N. Y.
151.—MACHINERY OIL.—Charles L. Morehouse, Cleveland, Ohio.
152.—ILLUMINATING OIL.—Charles L. Morehouse, Cleveland, Ohio.
153.—LUBRICATING OIL.—Charles L. Morehouse, Cleveland, Ohio.
154.—FACTORY OIL.—Charles L. Morehouse, Cleveland, Ohio.

EXTENSIONS.

D. H. WHITTEMORE, of Worcester, Mass.—Letters Patent No. 16,417, dated January 13 1857.
THADDEUS FAIRBANKS, of St. Johnsbury, Vt.—Letters Patent No. 16,381, dated January 13, 1857, reissue No. 445, dated March 31, 1857.
FRANCIS M. STRONG and THOMAS ROSS, of Vergennes, Vt.—Letters Patent No. 14,119, dated January 15, 1856.
ALBERT F. JOHNSON, Parkville, N.Y.—Letters Patent No. 16,387, dated January 13, 1857.

BUSINESS AND PERSONAL.

[*Short notices in this column fifty cents per line each insertion*]

GLYNN'S ANTI-INCRUSTATOR FOR STEAM BOILERS.—THE only and reliable article for removing and preventing incrustation. No foaming, and does not attack metals of boiler. Liberal terms to agents. C. D. FREDRICKS, 587 Broadway, N. Y.
April 19 tf

IMPORTANT TO INVENTORS.

WESTERN AND CO.'S PATENT AGENCY.

CHARLES R ERS, Solicitor and Manager.

In connection with the publication of the ENGINEERING and MINING JOURNAL and the MANUFACTURER AND BUILDER, we have frequently received applications from subscribers and patrons to act as their agents in transacting business with the United States Patent Office; and in view of the increasing number and urgency of such requests, we have resolved to add this department to our business. We have accordingly organized

A COMPLETE PATENT AGENCY,

and now offer our services in procuring patents in this and foreign countries, and transacting all business relating to the obtaining of patents.

Being possessed of superior facilities, in connection with our associate attorneys in Washington and foreign countries, for the successful prosecution of this business, we do not hesitate to guarantee satisfaction to all who may entrust their business to our care.

We have engaged as solicitor and manager Mr. CHARLES ROGERS, a well-known expert in this department. Being a practical mechanic, and having been an examiner in the Patent Office at Washington for a number of years, besides enjoying an experience of more than twenty years as a solicitor of patents, Mr. ROGERS is intimately acquainted with all the details of the business, both in and out of the office.

The specifications, drawings, etc., prepared in our office, will be found to compare favorably with those prepared by any other establishment, while the intimate acquaintance of our manager with the routine of business in the Patent Office, gives us a decided advantage in managing difficult cases.

We are fully prepared to prosecute Rejected Cases and Cases in Interference and Infringements, and also to procure Reissues and Extensions of Patents.

We can also furnish Models for use in the Patent Office, to parties who may desire it, as we have made arrangements for this purpose with one of the most skilful machinists in this country, who possesses every facility for getting up models in the most perfect manner, at short notice, and on reasonable terms.

We shall give special attention to the prosecution of Rejected Applications, which have been improperly prepared by the inventor or incompetent attorneys.

We shall be ready at all times to furnish all necessary information and advice to intending applicants, and give our opinion as to the patentability of their inventions, free of charge; and we make it a rule never to take charge of a case unless we see a reasonable probability of obtaining a patent without first giving the inventor our candid opinion as to the probable result of the application.

OUR CHARGES.

Our charges are as moderate as those of any other responsible patent attorneys, as will be seen from the following figures: For preparing a case (whether simple or complicated) and attending to its passage through the Patent Office, our fee is from $30 to $40, which includes all the necessary papers and drawings. If the application is rejected we make no further charge, but prepare all necessary amendments, and, if requisite, appeal to the Board of Examiners-in-Chief. Most Patent Attorneys make an additional charge on each adverse action of the Patent Office, but we have found it more satisfactory to all parties interested to make our full charge at first; and as we expect no contingent fees, it is to our interest to prepare our cases properly at the commencement, thus avoiding annoyance to ourselves and delay in getting out the patent.

The cost of getting out a patent through our agency is—	
For first Government fee, stamp, etc	$16
" our fee	$30 to 40
" final Government fee	20
Total	$66 to $76

If the case has to be appealed, the applicant pays the Government fee on appeal, $10; but we shall ordinarily make no additional charge for our services. The first two items are payable when the application is sent in, and the second Government fee when a patent has been allowed. Before an appeal is taken, in any case, the applicant will be fully advised of all facts and charges, and no proceedings had without his sanction; so that all inventors who employ our agency will know in advance what their applications and patents are to cost.

For Rejected Applications prepared by others, our charges vary somewhat according to the nature of the case, but are generally as follows:

In advance, on receiving the case	$10
When the patent is allowed	$20 to 30
Total	$30 to $40

the applicant paying such Government fees as may be required.

For preparing and filling a Caveat,	
Our fee is	$15
Government fee	10
Total	$25

For attending to the obtaining of Reissues, Extensions, etc. and preparing Assignments, our charges vary according to the labor involved.

We are possessed of all the facilities for the successful prosecution of applications for patents in Great Britain, France, Belgium, and other foreign countries, on favorable terms.

Inventors who reside out of New York, and wish to procure a patent, need not go to the expense of visiting this city or Washington, but may send us a model of their invention, or a sketch and brief description; this will enable us to decide as to its probable novelty and patentability, and we can proceed at once to prosecute the case. We shall, however, be glad at all times to see our friends from any section, and give them such information as we are possessed of relating to patents, free of charge. A Post-office order for $16, to pay the first Government fee and stamp duty, should be sent along with the model; our fee $30 to $40, being payable as soon as the application is ready to be sent to Washington.

Patents wanted through this agency will be described and illustrated in the columns of the ENGINEERING AND MINING JOURNAL or the MANUFACTURER AND BUILDER, without further charge to the inventor than the cost of the necessary cuts.

All communications to be addressed to

WESTERN & COMPANY,
P. O. Box, 5969. 37 PARK ROW, NEW YORK.

Advertisements.

The special advantages of the ENGINEERING AND MINING JOURNAL, *as a medium for advertisers, are so great and so widely known that it may seem almost needless to call attention to them. It is extensively circulated among the engineers of the country and takes a position in this respect before any other publication of the kind. It has a large and constantly increasing circulation among miners and mine owners, and men connected with mining operations generally. As it is the only paper in the country that makes this subject a specialty it has this field entirely to itself, and is the only direct and reliable means of reaching this class of persons. Being kept on file by almost every subscriber, it is doubly valuable as a permanent means of keeping an advertisement before the public. It is the recognized organ of the coal trade, and is taken extensively by the trade throughout the country and presents the very best means of reaching that very important class of men.*

Rates of Advertising.

The rate of advertising, compared with those of other weekly industrial publications, are very low, especially when the class of consumers among which its large circulation is almost entirely confined, is taken into consideration.

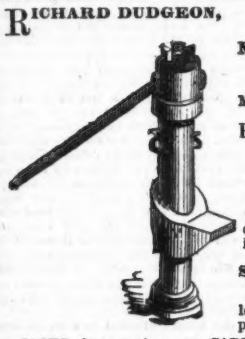
Back Page.....40 cents a line.
Inside Pages.....25 cents a line.

Engravings may head advertisements at the same rate per line, by measurement, as the letter-press.

MISCELLANEOUS.

FACTS FOR THE LADIES.—GEO. H. COLLINS, deposed: I have long regarded the Wheeler & Wilson Machine as the most ingenious in plan and the most remarkable in its performance. The wide range of work to which it is adapted, the great rapidity of its movement, and its almost noiseless execution, are due to its peculiar construction. I am satisfied that one of these machines will do eight or ten times as much as can be done by hand, and quite one fifth more than any other two-thread machine will do. With very trifling repairs, it will run ten years. No machine of equal merit has ever been under my observation.

RICHARD DUDGEON,



No. 24 Columbia st.,
NEW YORK,
Maker and Patentee of
Hydraulic Jacks
AND
Punches,
Roller Tube Expanders, and Direct Acting
Steam Hammers.
Communications by letter will receive prompt attention.

JACKS for pressing on CARWHEELS or CRANK PINS made to order. May22:1y

THE CHALMERS-SPENCE PATENT NON-CONDUCTOR CO.

ST. LOUIS BRANCH,
1202 & 1204 N. Second street
Never deteriorates. Saves 20 per cent. Keeps steam perfectly dry. Twenty of the largest Mississippi boats have their boilers, pipes, etc., covered with this invaluable material.
J. B. ROACH, Treasurer. T. CHALMER, Manager

DIAMONDS AND CARBON furnished and sold for drilling rock, sawing or working stone, also *Gaster's Diamonds*. See ENGINEERING AND MINING JOURNAL, January 17, 1871, for further particulars. Address: JOHN DICKINSON, 64 Nassau st., N. Y. 2mo

READY SHORTLY.
Randall's Quartz Operators.
HAND BOOK.
NEW EDITION, REVISED AND ENLARGED.
An indispensable volume for every practical miner, assayist and manufacturer of mining machinery.
12mo cloth $2 00.
Sent post-paid by mail upon receipt of price.
D. VAN NOSTRAND
PUBLISHER AND IMPORTER OF SCIENTIFIC BOOKS.
23 Murray and 27 Warren streets, New York.

*** A general catalogue of books in different branches of science will be mailed to any address upon receipt of 10 cents. 1t

WILLIAM F. McNAMARA,
SOLICITOR OF PATENTS
AND COUNSELLOR-AT-LAW.
No. 37 PARK ROW, NEW YORK, ROOM 22.
Advice in Patent Law given free. mar 8:tf

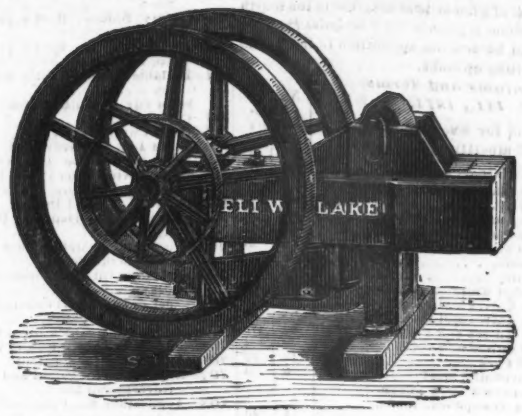
J. THOULET & C. RASCHER, MINING AND CIVIL Engineers, Maps, Topographical and Mining Surveys, Superintendense of Mines, Metallurgical and Chemical Works, Examinations and Reports on Coal and Metallic Mines, Assays, etc., Oriental building, 122 La Salle street.

FOR SALE OR EXCHANGE, AN INTEREST IN three Quarries of slate in Granville.
1t R. L. WILLIAMS, 112 Broadway.

LADIES DESIRING TO PROCURE A first-class Sewing Machine against easy monthly instalments or work, may apply to 294 Bowery, New York. Sept. 30-6m

MISCELLANEOUS.

BLAKE'S STONE BREAKER.



The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

Illustrated circulars, fully describing the machine, with ample testimonials to its efficiency and utility, will be furnished on application, by letter to the undersigned.

☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

Mch. 14-1y. **BLAKE BROTHERS, New Haven, Conn.**

JOHN A. GRISWOLD, ERASTUS CORNING. ERASTUS CORNING, JR., CHESTER GRISWOLD.

JOHN A. GRISWOLD & CO.,

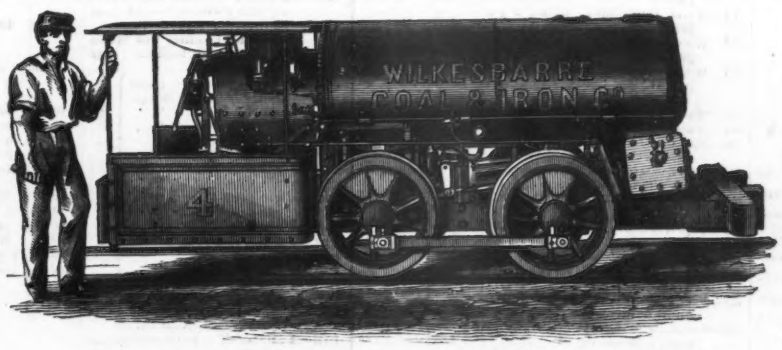
PROPRIETORS OF THE
RENSSELAER IRON WORKS,
TROY, N. Y.
Bessemer Steel Works, Fort Edward Blast Furnace and Columbia Blast Furnace
MANUFACTURERS of PIG IRON, RAILROAD, MERCHANT AND SHIP IRON,
Bessemer Steel Rails, Axles, Tyres, Shafting Plates and Steel Forgings,
OF ALL DESCRIPTIONS.
Office in New York, No. 56 Broadway.
May 17:1y

NEW JERSEY ZINC COMPANY.

B. S. GIBLIN, Treasurer. GEORGE A. BELL, President
WORKS NEWARK, N. J., OFFICE No. 61 MAIDEN LANE NEW YORK.
Franklinite Pig Iron (Spiegeleisen), Spelter, Oxide of Zinc, Spiegeleisen Cinder for Blast Furnaces.
May 24:1y

LEHIGH ZINC COMPANY.

GORDON MONGES, Treasurer. B. C. WEBSTER, President.
WORKS, BETHLEHEM, PA. OFFICE, 333 Walnut Street, Philadelphia.
JOHN JEWETT & SONS, AGENTS, 182 FRONT STREET, NEW YORK.
OXIDE OF ZINC, SPELTER, SHEET ZINC.
Jun28:1y



IMPROVED DIRECT-ACTING MINING LOCOMOTIVE.

Gauge, two feet six inches or upwards; Hight above rail, five feet four inches; Width over all, five feet one inch; Adapted to burn Anthracite or Bituminous coal or coke.

Materials and Workmanship Equal to those in Full Gauge Railroad Locomotives.

Guaranteed to pass curves of twenty-five feet radius and haul on a level track in good condition
Three Hundred and Forty Gross Tons of Cars and Load.
For Photograph and full particulars, address **M. BAIRD & CO.,**
Feb:7:1y:eow Baldwin Locomotive Works, Philadelphia.

EDSON'S

RECORDING STEAM GAUGE. These Gauges give an Automatically Written Record of all fluctuations in Pressure, to which a boiler has been subjected.

They Reduce the Risk of Explosions, by prompting a more careful attention to duty.

They Economise Coal, by showing when the firing is not periodically and properly done.

They Sound an Alarm when the limit of pressure is reached, and are adapted for Locomotives, Marine and Stationary Boilers.

Manufactured and for sale by the
RECORDING STEAM GAUGE CO.
91 Liberty street, New York.

TILTING RETORT FURNACES,
FOR SEPARATING ZINC FROM GOLD, SILVER AND LEAD, MELTING BRASS, ETC.
Patented October 25th, 1870.

A number of these retort-furnaces are in operation at the Smelting works of Messrs. Balbach & Son, at Newark, and Messrs. Webster, Lewis & Co., Jane street, New York.

For terms and information apply to
A. FABER DU FAUR, Patentee.,
Feb:1:2t 90 Broadway, New York.

ADOLPH OTT,
CHEMICAL ENGINEER,
May be employed professionally as an expert on practical subjects, involving both Chemical and Mechanical knowledge. A specialist in various branches of Technology. Assays and Analyses of all kinds. Address, Editorial Rooms of the "Engineering and Mining Journal," 37 Park Row, New York City.
☞ Written communications preferred. nov28-tf

MAGIC LANTERNS FOR SUNDAY Schools, Academies, Public Exhibitions, and Parlor Entertainments. Illustrated priced catalogues sent free. T. H. McALLISTER, Optician,
Dec.21:6m. 49 Nassau street, N.Y.

R. P. ROTHWELL,
MINING AND CIVIL ENGINEER
AND METALLURGIST,
From the Imperial School of Mines, Paris, member of the Geological Society of France, etc,
OFFICE, WILKESBARRE, PA.
Having had a large practical experience in Europe and this country, is prepared to examine and report on all kinds of mineral property, superintend mines, and metallurgical works, assay ores, etc. 12-2-qp

IMPROVED

TIN-LINED LEAD PIPE.

THE GREAT CHANGES WE HAVE recently made in the construction of our TIN-LINED LEAD PIPE has so added to its strength and durability as fully to entitle it to be termed IMPROVED. The lead coating has been increased, so that all sizes of our TIN-LINED LEAD PIPE are now the same thickness and weight of ordinary lead pipe. The increased thickness of the pipe allows the joints to be made with ordinary Plumbers' solder, and the Pipe to be worked in the same manner as Lead Pipe. The cost of the pipe has been reduced to the low price of fifteen cents per pound, with a discount to the trade.

PURE WATER

These improvements in our TIN-LINED LEAD PIPE have the hearty approval of ARCHITECTS and PLUMBERS wherever they are known.

Warranted to be stronger and more durable than Lead Pipe of corresponding sizes and letters.

In ordering or making inquiries for price, send bore of pipe required and head or pressure of water. Circulars and sample of pipe sent by mail free. Address,

THE COLWELLS, SHAW & WILLARD MF'G CO., 213 Centre street (between Canal and Grand streets), New York.

OPINIONS OF THE MEDICAL PROFESSION.

R. OGDEN DOREMUS, M. D., Professor of Chemistry and Toxicology in the New York Bellevue Hospital Medical College, writes? "There can be no question as to the poisonous nature of lead when introduced into the human system; and as it may gain entrance so insidiously, and from such a variety of sources, it has been a great desideratum to obtain an inert substitute for the conveying of liquids which should be pure, flexible, cheap, strong, durable and easily worked. By your ingenious invention of a pipe of Block-Tin, surrounded, strengthened and protected by a thick coating of lead, all the valuable qualities of Block-Tin are obtained, and all the objection to the use of lead removed. All points considered, I esteem your TIN-LINED LEAD PIPE superior to that made of Lead, Iron, Galvanised Iron, Block-Tin alone, or any other variety of Pipe I am familiar with."

"I am of the opinion that your Tin-Lined Lead Pipe will, in a sanitary point of view, be of infinite good to our citizens."—WILLARD PARKER, M. D., New York.

From the American Agriculturist.
NEW YORK, November, 1867.

"SAFE PIPE FOR DRINKING WATER.—Lead poisoning, from water brought in lead pipe, is the often unsuspected cause of disease and death. Galvanised iron pipe, wood and cement pipe, are expensive and inconvenient substances. The TIN-LINED LEAD PIPE, we believe, is perfectly safe. Our faith in it has led us recently to lay some eighty feet of it, through which all our drinking water is drawn."

NATIONAL PARK BANK,
NEW YORK, May 19, 1870.
TO THE COLWELLS, SHAW & WILLARD MF'G CO.:
DEAR SIRS: Our bank building having been plumbed throughout with your TIN-LINED LEAD PIPE, we take pleasure in stating that it has worked to our entire satisfaction. No repairs have been made up to the present time. Yours respectfully,
J. L. WORTH, Cashier.

THE COLWELLS, SHAW & WILLARD MF'G CO., 213 Centre street (between Canal and Grand streets), New York, manufacturers of TIN-LINED LEAD PIPE, BLOCK TIN PIPE, LEAD PIPE, SHEET LEAD, SOLDER, &c. Also, the Plumbers' TUBULAR SAFETY JOINT, particularly adapted to LEAD, BLOCK TIN and TIN-LINED LEAD PIPE. Orders solicited.

N. B.—Circulars and Samples of TIN-LINED LEAD PIPE sent by mail free.

P. H. VAN DER WEYDE, M. D.,
(Late Professor of the N. Y. Medical College, of Mechanics, etc., at the Cooper Institute, and of Industrial Science at the Girard College, Philadelphia.)
Analytical & Consulting Chemist and Engineer.
8 7 Pacific avenue, above Grand avenue, Brooklyn
Office ENGINEERING AND MINING JOURNAL, 37 Park Row New York City. jan30tf

THEODORE ALLEN,
ENGINEER,
No. 45 William street, New York.
Designs and Specifications prepared for all kinds of Iron Ships and Steam Machinery. Construction and Repairs superintended. Experiments conducted. Advice given, etc. All kinds of Machinery furnished Manufacturers' prices. feb8-t

Substantial Success Based on Merit!
THE
IRON WORLD AND MANUFACTURER
IS PUBLISHED WEEKLY AT
Pittsburgh, Pa.,
AND IS THE LEADING—IF NOT THE ONLY—REPRESENTATIVE JOURNAL OF THE METAL TRADES PUBLISHED IN THE UNITED STATES.

Located in the very centre of the metal interests of the United States, with offices and correspondents at the leading cities of the East, West and South, we do not err in claiming that it is the REPRESENTATIVE JOURNAL of the Metal Manufacturers, Workers and Dealers of this country.

THE IRON WORLD AND MANUFACTURER has a large and extended circulation throughout the United States, and is taken by Iron and Steel Manufacturers, Machinists, Founders, Hardware Dealers and Tinners, Gunsmiths, Plumbers, Cutlery Manufacturers, File Manufacturers, Saw Manufacturers, Boiler Manufacturers, and by

Leading Railway Officials.

It advocates protection to American manufacturers. Its markets are full and reliable. If you are a manufacturer, take the journal that advocates your interests. Don't patronize Free Trade journals, but help those who help you

With Free Trade the manufacturers of this country would be ruined. English gold is scattered with a liberal hand to further Free Trade. Expend some of yours to favor Protection.

If you advertise, which is the best medium? Circulation being equal, which would you patronize—a Free Trade journal or a Protection journal? Circulation is considered the value of an advertising medium. Much depends on the character of the circulation. The New York Weekly TRIBUNE claims 200,000 circulation, and gets from two to five dollars per line for advertising. The IRON WORLD reaches more people engaged in the metal business than the New York TRIBUNE. Our rates are about ten cents per line. Which will pay the best?

Sample copies mailed free. Address
IRON WORLD PUBLISHING CO.,
dec 12tf No. 71 Grand street Pittsburgh.

PUBLICATIONS.

THE MANUFACTURER AND BUILDER,

Western and Company, Publishers,
37 Park Row, New York.

ANNUAL SUBSCRIPTION PRICE (invariably in advance), $1 50 each for less than four copies; four to nine copies, $1 25 each; ten to fourteen copies, $1 20 each; fifteen to nineteen copies, $1 10 each; twenty copies, $1 each. Papers are addressed to each name.

$250,000

To be Given Away!

UNPRECEDENTED

LIST OF PRIZES.

THE

Manufacturer and Builder,

Offers to both

REGULAR AND VOLUNTEER CANVASSERS.

For cash subscriptions,

Princely Premiums for Great Efforts,

And

GENEROUS RETURNS FOR THE SMALLEST FAVORS.

Almost anything in the world, great or small, hat any body wants, can be acquired by canvassing for the

Manufacturer and Builder,

With less expenditure of time and labor, in most cases, than by any other method.

If not found with terms precisely specified in the following

Select Descriptive List of Hundreds of Rich Premiums,

It is only necessary to write to Western & Co., Publishers, 37 Park Row, New York, describing the COVETED ARTICLE, and special terms will be made for obtaining it as a Prize for Suscriptions; in most cases, terms that are equivalent to GIVING THE CANVASSER

NEARLY ALL HE CAN COLLECT,

As will be seen by examining the List.

In these days, CAPITAL is necessary for establishing the enormous circulation required to make a first-class periodical like THE MANUFACTURER AND BUILDER profitable in spite of its gigantic expenses. Capital is necessary to pay for the best productions of the best writers, for the costly designs and engravings, for the fine, thick paper, and for the extra style of printing, that make THE MANUFACTURER AND BUILDER the type of a new era in American polytechnic journalism. Capital is above all necessary to PAY THE ARMY OF CANVASSERS employed in bringing the merits and benefits of this journal home to the intelligent millions of the american people.

Our Plan for 1871

IS

CAPITAL WITHOUT STINT

For these purposes, and

MAGNIFICENT PAY

To all who help us.

We desire to pay out the coming year not less than a Quarter of a Million of Dollars from our receipts and reserves, for the services of Volunteer Agents alone, in all the States, Territories, and Provinces of North America. Our paper challenges comparison with the best Journals of Arts and Engineering in the world. It is at the same time one of the cheapest publications ever issued from the press; and to all its attractions we now add a range of Premiums tantamount almost to a free gift of our paper, our labor, our earnings, for the year, for the sake of introducing THE MANUFACTURER AND BUILDER to myriads of readers, whose patronage in future years will recompense our present lavish outlay.

For these premiums are to be not only offered, but **paid**; not only paid, but paid **promptly**, to the letter and spirit of the description, and to the satisfaction of all. Every premium is of the best and most desirable kind we can select, and from manufacturers whose names are a guarantee of excellence.

The premiums range from twenty-five cents to twelve hundred dollars in value—the prices annexed re in no case exaggerated, but the actual cash value uvariably—so that one who aims at a large premium will not lose his labor even if obliged by any cause to uspend his efforts, because it is never too late to decide what premium to select, and no list is too small to arn a valuable prize, or rather a choice of many valuable prizes.

Every class of persons can share in this profitable employment, at times, in ways and in places suited to their circumstances, and with rewards adapted to their different desires.

You never know what you can do until you Try.

Thousands of persons, of both sexes, once straitened and perplexed to get a living, have suddenly found out that they had the gift to **get rich by canvassing!** Stu y the nature of the business, and particularly human nature; study the arguments and inducements for subscription to THE MANUFACTURER AND BUILDER, lay your plans well, and get every body to help you, and then let nothing discourage or stop you.

In the following table is given the price of each article, and the number of subscribers required to get it free, at $1 50 a year; also at the club rate of $1 a year. The descriptions of a few articles are given in the fourth column, the balance is given in our *Descriptive Premium Sheet*, which will be sent on application to those who contemplate getting up clubs.

List of Premiums and Terms for Vol. III., 1871.

A Free Field for Everybody. No Competition.

No.	*Names of Premium Articles.*	*Price of Premium.*	*Number of Subscribers required at $1 50*	*at $1*
	FROM PATTERSON & BROS.			
1—	Tool Chest	$45 00	60	190
2—	Case Mathematical Instruments	9 00	18	65
3—	Case Mathematical Instruments	15 00	22	75
4—	Pocket Knife	1 50	4	21
5—	Pocket Knife	2 00	5	22
6—	Pocket Knife	2 50	6	25
7—	Lady's Pocket Knife	2 00	5	22
8—	One dozen Knives and Forks	14 0	21	70
9—	One dozen Knives and Forks	18 50	27	90
10—	One dozen Knives and Forks	22 00	33	110
11—	One dozen Knives and Forks	25 50	39	124
12—	Carver and Fork	5 00	13	37
13—	Fluted Sharpening Steel	2 50	6	25
	FROM HALL, ELTON & CO.'S PLATE.			
14—	One dozen Tea-spoons, medallion	5 75	14	40
15—	One dozen Table-spoons, medallion	12 00	19	65
16—	One dozen Table Forks, medallion	12 00	19	65
17—	Butter-Knife, medallion, solid	1 00	4	
18—	Soup-Ladle, medallion	5 75	14	40
19—	Ice or Water-Pitcher, No. 3	17 00	26	80
20—	Pocket Fruit Knife, No. 12	2 00	5	22
21—	Revolving Butter-Cooler, No. 80.	8 00	16	52
22—	Cake-Basket, No. 1867	10 00	18	58
23—	Caster, 6 bottles, chased, No. 2039	9 25	18	54
24—	Fruit-Basket, No. 200	13 50	21	75
25—	Child's Cup, No. 041	2 75	6	25
26—	Knife, Fork, and Spoon, child's set, morocco case	3 00	8	30
27—	One dozen Napkin-Rings, medallion	9 00	17	54
28—	Tea Set, gold lined, No. 1822	48 00	52	180
29—	Tea Set, No. 1866	36 00	45	135
	FROM COLBY BROS. & CO.			
30—	Knif -C eaner	75	2	
	FROM MARIE, TODD & CO.			
31—	Gold Pen and Pencil, rubber case	8 00	15	45
32—	Gold Pen and Pencil, rubber case	6 75	13	37
33—	Gold Pen, silver or gold holder, in box	4 25	9	32
34—	Gold Pen, extension gold case, in box	20 00	29	90
35—	Lady's Gold Pen, ivory holder, in box	2 75	6	25
	FROM HENRY RUSSELL & CO.			
36—	Downer Mineral Oil Lamp, No. 1936	4 75	10	35
37—	Downer Mineral Oil Lamp, No. 1963	9 25	17	56
	FROM C. F. A. HEINRICH.			
38—	St. Germain Student Lamp, largest size	8 25	15	45
	FROM FAIRBANKS & CO.			
39—	Family Scales	14 00	21	70
	FROM COLBY BROS. & CO.			
40—	Clothes-Wringer	7 50	10	35
	FROM ALEXANDER M. LESLEY.			
41—	Refrigerator, the Zero, No. 38	38 00	42	142
42	Cooler, the Newport, No. 1	12 00	15	45
43—	Hot-Air Coal Furnace, the Gothic, No. 9	125 00	135	450
44—	Hot-Air Wood Furnace, Gothic, No. 10	150 00	162	525
	FROM THE STANLEY RULE & LEVEL CO.			
45—	Iron Smoothing-Plane, Bailey's patent	5 00	13	37
46—	Iron Smoothing-Plane, Bailey's patent	6 50	14	42
47—	Iron Jack-Plane, Bailey's patent	7 50	15	47
48—	Iron Fore-Plane, Bailey's patent	9 00	17	55
49—	Iron Jointer-Plane, Bailey's patent	10 00	18	58
50—	Wood Smoothing-Plane, Bailey's patent	3 00	8	30
51—	Wood Fore-plane, Bailey's patent	4 50	10	35
52—	Wood Jointer-Plane, Bailey's patent	4 75	12	36
53—	Wood Jointer-Plane, Bailey's patent	5 50	14	40
	FROM POST & GODDARD.			
54—	Machinists' Hand-Taps	17 60	25	75
55—	Machinists' Hand-Taps	52 80	65	220
56—	Machinists' Hand-Taps (your choice)	5 00	12	37
57—	Screw-Plates and Dies, size A	8 00	15	45
58—	Screw-Plates and Dies, size B 1	10 00	18	58
59—	Screw-Plates and Dies, size C 1	13 00	20	70
60—	Screw-Plates and Dies, size D 1	3 00	7	25
61—	Tap-Wrenches, size A	4 00	9	30
62—	Tap-Wrenches, size B	5 00	12	37
63—	Tap-Wrenches, size C	19 75	29	90
64—	Set of 11 Taper Shank-Twist Drills, No. 1	12 00	18	60
65—	Set of 29 Drills, straight shank, mounted, No. 9	8 00	15	45
66—	Set of 60 Drills, steel wire gauge from 1 to 60, No. 12	44 00	58	175
67—	Set of 21 Taper-Shank Drills, No. 3	2 80	6	25
68—	Set of 9 Bit-Stock Drills, 1-16 to 3 8 in	10 00	18	58
69—	Self-Centering Drill-Chucks, Beach's patent, for jewelers, No. 0	7 00	14	40
70—	Self-Centering Drill-Chucks, Beach's patent, for drilling, No. 0	6 00	13	38
71—	Self-Centering Drill-Chucks, Beach's patent, 0 to 3-16, No. 1	7 00	14	40
72—	Self-Centering Drill-Chucks, Beach's patent, 1 to 60 S. W. E, No. IX	14 00	23	77
73—	Self-Centering Drill-Chucks, Beach's patent, 0 to ½, No. 3.	10 00	18	58
74—	Drill-Grinding Machine, No. 1	20 00	30	95
75—	Drill-Grinding Machine, No. 2	—	—	—
76—	Auger-Bits, your choice of 4 sets			
	FROM L. W. POND.			
77—	Foot-Lathe, No. 1	50 00	65	204
78—	Foot-Lathe, No. 2	30 90	47	124
	FROM COLBY BROS. & CO.			
79—	Miniature Steam-Engine and Boiler	1 36	5	23
	FROM RUSSELL & SPEIR.			
80—	Steam-Engine (1 H. P.) and Boiler	300 00	310	1125
81—	Steam-Engine (3 H. P.) and Boiler	600 00	640	2250
82—	Steam-Engine (5 H. P.) and Boiler	800 00	858	3000
83—	Steam-Engine (10 H. P.) and Boiler	1200 00	1285	4500
84—	Steam-Pump, C. B. Hardick's, No. 0	120 00	155	540
85—	Steam-Pump, Cameron & Co.'s, No. 1	150 00	192	675
86—	Steam-Pump, Cameron & Co.'s, No. 2	200 00	257	900
87—	American Submerged Pump	12 00	19	65
	FROM GEORGE TALLCOT.			
88—	Turbine Water-Wheel, Reynold's, 12 in.	165 00	125	360
89—	Turbine Water-Wheel, Reynold's, 24 in.	226 50	270	800
90—	Turbine Water-Wheel, Reynold's, 36 in.	384 50	460	1350
91—	Rotary Blower, Root's patent No. 1	$5	70	275
92—	Rotary Blower, Root's patent, No. 2	80	105	420
93—	Portable Forge, Root's patent, No. 1	48 00	65	260
94—	Portable Forge, Root's patent, No. 3	80 00	105	420
	FROM THE AMERICAN SAW CO.			
95—	Circular Saw	125 00	135	473
96—	Cross-Cut Saw	6 60	14	42
	FROM A. P. & M. STEPHENS.			
97—	Labor-Saving Vise, 2-in. jaw	4 00	9	32
98—	Labor-Saving Vise, 4¼-in. jaw	12 00	28	58
	FROM THE STANLEY RULE & LEVEL CO.			
99—	Boxwood two-foot Rule	2 50	6	25
100—	Silver-Plated Triangular Drawing-Scale	6 00	16	52
101—	Pocket Sheet-Metal Gauge	5 00	13	37
102—	Arkansas Oil-Stone	1 75	5	22
103—	Arkansas Oil-Stone, mahogany case	3 25	8	30
104—	Gear or Cog-Wheel Calculating-Rule	4 00	12	36
	WESTERN & COMPANY'S AGENCY.			
105—	Preparing and Filing a Caveat	25 00	28	80
106—	Application for a Patent	30to40	35	100
107—	Application for Patent and first Government fee	46to56	50	150
108—	Application for Patent and all Government fees	66to76	75	250
	FROM J. W. HUTCHINSON.			
109—	English Breech-loading double-barrel Gun	100 00	110	350
110—	English Muzzle-loading double-barrel Gun	75 00	85	250
111—	Breech-loading Rifle, the Allen	30 00	46	150
112—	Revolver, Smith & Wesson's, No. 1½	12 50	19	65
113—	Revolver, Smith & Wesson's, No. 2	15 00	22	75
	FROM MASON & HAMLIN.			
114—	Melodeon, portable, No. 1, 4 octave	50 00	66	200
115—	Melodeon, resonant, style G, 5 octave	170 00	146	510
116—	Pipe-Organ, church use, style No. 29	675 00	579	2000
	FROM J. S. & C. ODELL.			
117—	Pipe-Organ,	500 00	430	1500
118—	Pipe-Organ	700 00	600	2100
119—	Broadbury Square Piano-Forte, No. 4	650 00	430	1500
120—	Steinway's No. 1 Grand Piano	1200 00	860	3000
	THE AMERICAN WATCH CO., WALTHAM, MASS.			
121—	Silver Watch	20 00	32	100
122—	Silver Watch	35 50	48	142
123—	Gold Watch	50 00	65	200
124—	Lady's Gold Watch	100 00	110	350
	FROM THE UNITED STATES WATCH CO.			
125—	Silver Watch	40 00	50	150
126—	Silver Watch	66 00	75	275
127—	Gold Watch	100 00	100	300
128—	Silver Watch	104 00	104	312
129—	A Sewing Machine (your choice)	65 00	65	200
	FROM MCALLISTER.			
130—	Microscope and 48 objects	10 00	14	40
	FROM COLBY BROS. & CO.			
131—	Velocipede for Boys	16 00	16	52
	FROM MCALLISTER.			
132—	Magic-Lantern, No. 433	20 00	30	95
	FROM H THOMPSON.			
133—	An Easy Chair			
	FROM D. APPLETON & CO.			
134—	New American Cyclopædia, 16 vols	80 00	80	213
	FROM G. & C. MERRIAM.			
135—	Webster's Unabridged Pictorial Dictionary	12 00	15	45
136—	Webster's National Pictorial Dictionary	6 00	10	35
	FROM WESTON & COMPANY.			
137—	One back vol. Manufacturer and Builder, unbound, post-paid	1 75	6	25
138—	Two back volumes Manufacturer and Builder, unbound, post-paid	3 50	11	37
139—	One back vol. Manufacturer and Builder, bound, post-paid	2 50	9	32
140—	Two back volumes Manufacturer and Builder, bound, post-paid	5 00	18	58
141—	Cover for binding the Manufacturer and Builder, post-paid	60	3	21
142—	A $10 Library (your choice from list in special sheet),	10 00	18	58
143—	A $15 Library, "	15 00	24	85
144—	A $20 Library, "	20 00	31	106
145—	A $25 Library, "	25 00	38	125
146—	A $30 Library, "	30 00	44	144
147—	A $35 Library, "	35 00	50	162
148—	A $40 Library, "	40 00	56	177
149—	A $45 Library, "	45 00	62	192
150—	A $50 Library, "	50 00	68	207
151—	A $60 Library, "	60 00	80	237
152—	A $75 Library, "	75 00	100	282
153—	A $100 Library, "	100 00	125	360

A 1 paid through by mail or express.

154— A choice of good Books (see terms in another column)

155— A choice of convenient Book-Cases (see special sheet)

156— A choice of popular Music (see terms in special sheet)

157— A choice of Games and Toys, (see terms in special sheet)

We have taken especial pains to select in making up our price list the NEWEST and very BEST articles. No charge will be made for boxing or packing any article on our list. The Premiums, Nos. **4** to **7** inclusive, **31** to **35** inclusive, **79, 99, 101, 105** to **108** inclusive, **121** to **128** inclusive, **137** to **141** inclusive, **154, 156, 157,** will each be delivered FREE of charge by mail or express (at the Post-office or express office nearest recipient) to any place in the United States or Territories. The other articles cost the recipient only the freight after leaving the manufactory of each, by any conveyance specified.

As an aid to those who engage upon large clubs, we will count subscriptions by *one* individual for 1869, 1870, and 1871, as *three* subscribers toward a premium. Every *new* subscriber should have the work upon the beginning. Bound volumes may be counted in the same way—each as one subscriber—except, of course, when they are obtained as a premium.

Do not fail to note the following Points:

1. All subscribers sent by one person count, though from one or a dozen different post-offices. But

2. State with each name or list of names sent that it is for a premium.

3. Send the names as fast as obtained, that the subscribers may begin to receive the paper at once. You can have any time, from one to six months, to fill up your list.

4. Send the exact money with each list of names, so that there may be no confusion of money accounts.

5. Old and new subscribers all count in premium clubs, but a portion, at least, should be new names; it is partly to get these that we offer premiums to canvassers.

N.B.—The extra copy to clubs of ten or twenty is not given where premium articles are called for.

6. Specimen numbers, cards, and show-bills will be supplied free, as needed by canvassers; but they should be used carefully and economically, as they are very costly.

7. Remit money in Checks on New York banks or bankers, payable to order of WESTERN & COMPANY, or send Post-Office Money Orders. If neither of these is obtainable, Register Money Letters, affixing stamps both for the postage and registry; put in the money and seal the letter in the presence of the postmaster, and take his receipt for it. Money sent in any of the above ways is at our risk.

DESCRIPTIVE LIST OF PREMIUMS.

Every Premium in the annexed list is described in the December MANUFACTURER AND BUILDER, *and also in a* **Special Descriptive Sheet,** *which will be sent* **free** *to every one desiring it. We have room here for the following only:*

Nos. 105 to 108—To Procure a Patent without Money.—We have met with many having valuable inventions, which inventors are anxious to get patented, but are unable to afford the expense, and consequently fail to secure the profits which a patent might produce To such as are in this position, we make the following liberal offer: No. **108**—We will prepare an application for a patent, attend to its passage through the Patent Office, and pay all government fees and incidental expenses attending the same, for any inventor preventing a patentable invention, who will get up a club of seventy-five subscribers for THE MANUFACTURER AND BUILDER for one year at $1,50 each, or 250 at $1 each, and send us the money by post-office order. If this application should be rejected, they may send us an additional list of thirty subscribers at $1.50 each, and the subscription money for the same, on receipt of which we will prepare and prosecute a second application, paying all government fees and incidental expenses. No. **107**—For a list of fifty subscribers at $1.50 each, or 150 at $1 each, with the cash accompanying it, we will prepare an application, attend to its passage through the office, and pay the government fee ($15), the applicant paying the second government fee of $20. No. **106**—For a list of thirty-five subscribers at $1.50, sent in the same way, we will prepare and prosecute an application, the applicant paying the government fee. No. **105**—for twenty-eight subscribers at $1.50 each, or eighty at $1 each, we will prepare and file a caveat, furnish the necessary drawings, (which we also furnish in all the above cases), and pay all government fees. All cases placed in our hands under these arrangements will receive our best attention, equally with those for which our fees have been paid in cash, and will be appealed to the Board of Examiners-in-Chief if necessary, the applicant paying the government fee of $10 on such appeal. If the inventor has no model to accompany his application, he may procure additional subscribers, the premium on which (see cash rates) will enable him to pay for the model. A club of 100 names has been obtained in a single establishment where from 150 to 200 hands are employed. A village of 500 inhabitants will take this number readily.

No. 129—Sewing Machines.—Your choice! A $65 machine for 65 subscribers, at $1.50 each.—It makes no difference to us which machine we send, or whether it is selected at first or at the last moment. No charge for boxing the machines; they go safely as freight. For circulars, giving full particulars in regard to style of machines, fixtures, etc., as well as instructions, send to **Grover & Baker Manufacturing Co.,** 495 Broadway, New York; **Florence Sewing Machine Co.,** 505 Broadway, New York; **Wilcox & Gibbs Sewing Machine Co.,** 658 Broadway, New York; **Singer Sewing Machine Co.,** 458 Broadway, New York.

Nos. 137, 138—Volumes of the Manufacturer and Builder.—The unbound volumes of THE MANUFACTURER AND BUILDER consist of a set of numbers for a year, each separate in its own paper cover. These volumes amount to a valuable Library on all matters pertaining to the Industrial Arts, and contain more varied information on manufacturing building, and mechanical jects than can be obtained in books costing three times as much. The price of the volumes unbound is $1.50 each, at the office, or $1.75 if sent by mail, as they must be post-paid. They are profusely illustrated, the engravings used in them having alone cost thousands of dollars. For ordinary use, the sets of numbers unbound will answer quite well.

Nos. 139, 140—Bound Volumes of the Manufacturer and Builder.—*New* subscribers almost invariably desire to secure the back numbers of THE MANUFACTURER AND BUILDER from its commencement. Some desire them bound in our uniform style, while others prefer to get the loose numbers and have them bound to suit their own tastes. *Our* binding is very neat, and being done in large quantities at one time, is furnished at a *very cheap* rate. It is moreover very handsome, being of cloth, with gilt title and back, sides embossed and ornamented with a neat architectura device stamped in gold. The price of the volumes is $2.50 each, sent post-paid.

No. 141—Covers for Binding the Manufacturer and Builder.—These are described in premium 139, 140. Now ready for 1869 and 1870. Be careful to state *which year* you require. Any country binder will insert the year's numbers in one of these covers at a moderate cost. Price, 50 cents; sent, *post-paid*, on receipt of three subscribers at $1,50 for each cover.

Nos. 142 to 154—Good Libraries.—In these premiums we offer a choice of books for manufacturers, mechanics, artisans, builders and others. The person entitled to any one of the premiums 142 to 153, may select any books desired from the list published in our Special Premium Sheet, to the amount of the premiums, and the books will be forwarded, post or express paid. $25 or $50 worth of books pertaining to the industrial arts will give the boys new ideas, set them to thinking and observing, and thus enable them to make their heads help their hands. Any good book will, in the end, be of far more value to a youth than to have an extra hundred dollars on coming to manhood. ☞ Let the mechanics of a neighborhood unite their efforts, and through these premiums get an industrial library for general use.

No. 154—General Book Premium.—Any one sending twenty-five or more names may select books from our list to the amount of ten cents for each subscriber sent at $1; or thirty cents for each name sent at $1.20; or sixty cents for each name at $1.50. *This offer is only for clubs of twenty-five or more. The books will be sent by mail or express, prepaid through by us.*

SPECIMEN COPIES, CIRCULARS, SHOW-BILLS, etc.,

will be furnished free of charge in sufficient quantities to meet the reasonable requirements of agents. We would respectfully request that they do not waste them, but distribute them judiciously. If some unexpected event should prevent them from continuing in the business, they will do the square thing by us by giving their outfit to some friend, who will continue the business where they have left off; and who will no doubt be grateful for the opportunity of receiving profitable employment.

Postage.

Every subscriber pays his own postage at the office where he receives the paper. This is only twenty-four cents per year, or six cents per quarter, payable in advance.

Don't Give up Your Town

until everybody has been supplied with a circular and has had a chance to subscribe; and be sure that you

PUBLICATIONS.

leave your address, so that they may know where to find you in case they should make up their minds to take the magazine after you have left them. Make all drafts, money-orders, and registered letters payable to the order of Western & Company, publishers, and address all communications

WESTERN & COMPANY, Publishers,
NO. 37 PARK ROW, NEW YORK.

TABLE OF CASH PREMIUMS For 1871.

EVERY MAN HIS OWN PAY-MASTER. STEADY EMPLOYMENT AND GOOD PAY.	PREMIUMS. At $1 50 each.	PRE'S. At $1 00 each
For every club of 4 subscribers.....	$1 00	
" " " 10 "	3 00	
" " " 15 "	6 00	
" " " 20 "	10 00	
" " " 30 "	16 50	$1 50
" " " 40 "	24 00	4 00
" " " 50 "	32 50	7 50
" " " 75 "	48 75	11 25
" " " 100 "	65 00	15 00
" " " 200 "	140 00	40 00
" " " 500 "	350 00	100 00
" " " 1000 "	700 00	200 00

INTERMEDIATE CLUBS.

It often happens that clubs are made up of numbers that are not found in the above table. Names may be added to clubs at the following rates :

In clubs of	4	and less than 10..	$1 25	for each name.	
" "	10	" " 15..	1 20	"	"
" "	15	" " 20..	1 10	"	"
" "	20	" " 30..	1 00	"	"
" "	30	" " 40..	95	"	"
" "	40	" " 50..	90	"	"
" "	50	" " 200..	85	"	"
" "	200	" " 500..	80	"	"
" "	500	" " 1000..	80	"	"
" "	1000	and over.....	80	"	"

The Profits of the Cash Business, it will be seen by the above tables, are large and accrue rapidly. Every experienced canvasser knows that it is far easier to obtain 4 subscribers to a paper like THE MANUFACTURER AND BUILDER at $1 50 each than to get 1 subscriber to a high-priced magazine, costing $6. This is more strikingly evident when the fact is taken into consideration that our paper, costing only $1 50, is ACTUALLY SUPERIOR IN EVERY RESPECT TO ANY THING OF THE KIND IN THE COUNTRY COSTING TWICE THAT SUM.

There is another point in favor of our Magazine, as compared with a higher-priced periodical. This is the well-known fact, that in a manufacturing establishment, or even in a town, the working-men will rarely look at a paper costing $3 or $6, and the result is that only rich persons, comparatively, and proprietors can be solicited with any success. Now, these persons are scarce in any community; and a paper that comes within the means and comprehension of the masses or majority of the people, of course commands an immensely wide field. Hence, instead of getting only the proprietor of a manufactory, or the rich men of a town, the working-men can be approached with success; and out of a single establishment as many as 100 subscribers have easily been obtained. This is a very important point to canvassers, and where the large profits with but little effort come in. Try it.

Make all drafts, money orders, and registered letters payable to the order of WESTERN & COMPANY, Publishers, and address all communications,

WESTERN & CO., Publishers,
"The Manufacturer and Builder,"
37 Park Row, New York.

INSTRUCTION.

SCHOOL OF MINES, COLUMBIA COLLEGE.

FACULTY.—F. A. P. BARNARD, S.T.D., LL.D., PRESIDENT; T. EGLESTON, JR., E. M., Mineralogy and Metallurgy; C. F. CHANDLER, PH. D., Analytical and Applied Chemistry; JOHN TORREY M.D., LL.D., Botany; C. A. JOY, PH. D., General Chemistry; W. G. PECK, LL.D., Mechanics; J. H. VAN AMRINGE, A.M., Mathematics; O. N. ROOD, A.M., Physics; J. S. NEWBERRY, M.D., LL.D., Geology and Paleontology. Regular courses in Mining Engineering; Metallurgy; Geology and Natural History; Analytical and Applied Chemistry. Special students received for any of the branches taught. Particular attention paid to Assaying. For further information and catalogues, apply to

DR. C. F. CHANDLER,
nov21-1y-is Dean of the Faculty.

AVELING & PORTER'S
PATENT ROAD LOCOMOTIVE,
OF WHICH THERE ARE AT THIS TIME UPWARDS OF
500 IN REGULAR USE IN EUROPE,

Has been awarded the First Prize Gold Medals at all the International Exhibitions of Europe, including London, 1862, Paris, 1867 and Brussels, 1868.

They are made from 4 to 20 horse-power; will haul from 10 to 60 tons along ordinary roads, and travel up inclines of 1 in 10. They are much simpler and more powerful; they are more durable and cost less, and are applicable to a greater variety of uses than any other Traction Engine made.

They are suitable for
STEAM PLOUGHING, DRIVING PUMPS, SAWS AND OTHER MACHINERY,
LIFTING AND LOWERING HEAVY WEIGHTS, STUMP PULLING, &c., &c.

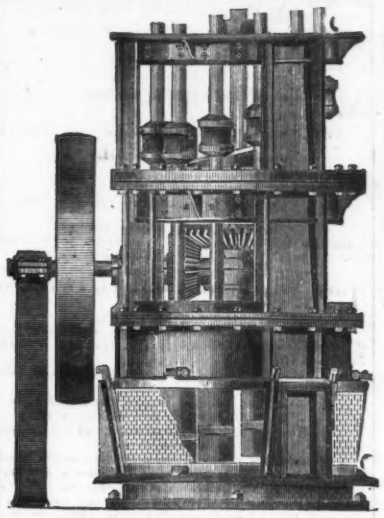
AVELING & PORTER, Manufacturers, Rochester, Eng. Agent for the United States: **W. Churchill Gastler**, 43 Exchange Place, New York.
TRAMWAY ENGINES FOR MINES, &c., STEAM PLOUGHS STEAM ROAD ROLLERS, AGRICULTURAL LOCOMOTIVES.
Circulars on application. o11:6m

E. F. DUNNE,
Attorney and Counsellor at Law,
1301 F STREET, WASHINGTON, D. C.,
PACIFIC COAST.—Will practice in all the Federal Courts. Specialty in Patents for Lands, Mines, and Town-Sites. mar15-1y

FILE-COVERS. FILE-COVERS. For preserving the numbers of the ENGINEERING AND MINING JOURNAL. Price $1.50. For sale by WESTERN & CO., 37 Park Row, New York.

MINING MACHINERY, ETC.

MINING MACHINERY OF ALL KINDS.
MANUFACTURED BY MOREY & SPERRY.



HOWLAND PATENT ROTARY BATTERY

of 12 stamps. It requires no frame to put it up. Guaranteed to crush 2½ to 3 tons per day to the stamp. The best Battery ever used for amalgamating gold, or crushing silver ores, dry or wet. Can be put up on a mine in running order for one-half the price of the straight battery, and in three days after its arrival at the mine. 12-stamp battery, 20,000 pounds, with frame complete; 6-stamp battery, 7,000 pounds. Every mill run at shop before shipping.

CALIFORNIA STAMP MILLS,

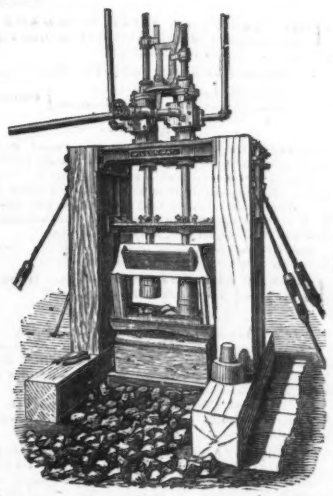
All the various styles of Pans, Amalgamators, Rock Breakers, Separators, Settlers. Concentrators, Dry or Wet, for working Gold, Silver or Copper Ores, the same as built in California and at lower prices. SHOES AND DIES made of the best white iron. Send sizes and we will make patterns and forward Shoes and Dies at low prices. Engines, Boilers and fixtures, and other Machinery made to order. Also, Howland's Patent Rotary Valve Double or Single Engines.

Irons for the best California stamp mill, straight battery, complete. Also, Irons for low mortar, old style mill, and all other kinds.

☞ Send for a Circular.
Address
MOREY & SPERRY,
Jan 10:y 95 Liberty Street New-York.

THE WILSON PATENT
Steam Stamp-Mill Company,
OF PHILADELPHIA, PA.

Are now prepared to supply Miners and other parties with their



New Steam Stamp-Mills
AT THE SHORTEST NOTICE.

These Mills have now been in operation for upwards of a year, and have proved to be the most durable and efficient, as well as the lightest for transportation, of any mills now used. The valve gear is of the simplest and most durable construction, readily adjustable by movable cams on the piston rods or stamp stems, thereby giving the operator absolute control of the length and velocity of motion and force of the blow. These Mills are adapted for both dry and wet crushing, and for the hardest rock or softest cement. These Mills are every way equivalent to a Twenty Stamp Mill. For further particulars call on or address

THE WILSON PATENT STEAM STAMP-MILL COMPANY,
Aug31-1y 326 Walnut street, Philadelphia.

KROM'S DRY ORE CONCENTRATOR.

Concentration by means of Air

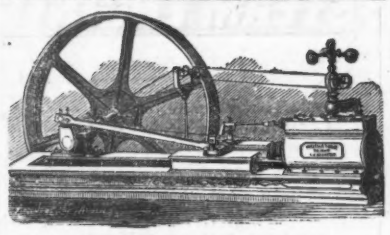
has long been attempted, but hitherto without satisfactory results. S. R. Krom has invented and patented machines which concentrate the various ores more perfectly than can be done by any other means.

The *MECHANICAL COMBINATIONS* are extremely simple, the machines therefore correspondingly durable. A continuous self-delivery of ore on one side and tailings on the other is effected, hence very little attention is required, except keeping the hopper supplied with ore. The power of one man is sufficient to operate a mach in that will concentrate one ton per hour.

PARTIES INTERESTED IN MINING are invited to call at No. 210 Eldridge Street, New York, where they may see a machine in operation, and have samples of their own ores crushed and concentrated.

Illustrated Circulars may be had on application to
STEPHEN R. KROM,
san10,1y-is No. 210 Eldridge Street, N. Y.

ENGINES, IRON WORK, ETC.



TODD & RAFFERTY.
GENERAL
MACHINERY MERCHANTS, ENGINEERS, AND MACHINISTS,

Manufacturers of Stationary and Portable Steam Engines and Boilers; also Flax, Hemp, Tow, Oakum, and
ROPE MACHINERY,
MILL GEARING,
SHAFTING.
Lathes, Planers, Drills, Chucks, etc. Iron and Brass Castings. Judson & Snow's Patent Governors constantly on hand.
OFFICE AND WAREROOMS, NO. 10 BARCLAY STREET, N. Y.
Office and Works, Paterson, New Jersey.
JOSEPH C. TODD. oct-27-tf. PHILIP RAFFERTY.

CIRCULAR SAWS WITH EMERSON'S PATENT MOVEABLE TEETH.

These Saws are meeting with unprecedented success, and their great superiority over every other kind, both as to efficiency and economy, is now fully established
Also,
EMERSON'S PATENT PERFORATED CIRCULAR AND LONG SAWS,
(All Gumming avoided,) and
EMERSON'S PATENT ADJUSTABLE SWAGE,
for Spreading, Sharpening, and Shaping the teeth of all Saws. Price, $5. Manufactured by the
AMERICAN SAW COMPANY
Office No. 1 Ferry St., corner Gold St., New York.
Factory, Trenton, N. J. Branch Office for Pacific Coast, No. 606 Front St., San Francisco, Cal.
Send for new Descriptive Pamphlet and Price List.
july1-1y

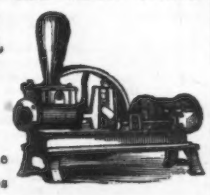
COOPER'S GLUE AND REFINED GELATINE.

COOPER HEWITT, & CO.,
NO. 17 BURLING SLIP, NEW YORK.
Bar Iron, Braziers' Rods, Wire Rods, Rivet and Machinery Iron, Iron and Steel
Wire of all Kinds, Copperas,
&c., &c.
RAILROAD IRON, COOPER WROUGHT IRON BEAMS AND GIRDERS,
Semi and Cast-Steel. Gun-Barrel and Compcnent Iron,
PUDDLED AND REFINED CHARCOAL BLOOMS,
Ringwood Anthracite and Charcoal Pig Iron.
Works at Trenton and Ringwood, N. J.
May 17:1y

ALBERT BRIDGES,
MANUFACTURER AND DEALER IN
Railway and Mining Supplies and Machinery.

Ball's Patent Telescope Jack.
NO. 46 COKTLANDT STREET,
P. O. Box, 2813. NEW YORK.
Aug 31-1y

J. CLAYTON'S
Patent Fly Wheel and Direct Action
STEAM PUMPS,
HAND PUMP AND STEAM ENGINE COMBINED.



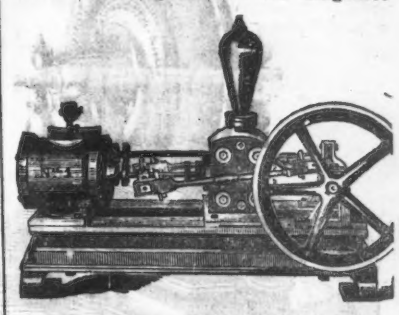
These pumps are the cheapest first-class pumps in the market.

All sizes made to order at short notice.

JAMES CLAYTON, 24 & 26 Water st.,
Office: 50 John street, New York.
Nov18-tf Brooklyn, N. Y.

STEAM PUMPS.

THE WOODWARD
Steam Pump Manufacturing Company.
MANUFACTURERS OF THE
WOODWARD PATENT IMPROVED SAFETY
Steam Pump and Fire Engine.

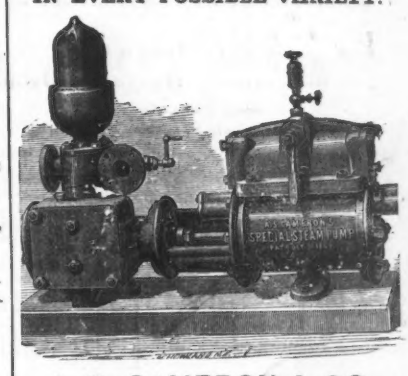


STEAM, WATER, AND GAS FITTINGS OF ALL KINDS.

Also dealers in WROUGHT IRON PIPE, BOILER TUBES, etc. Hotels, Churches, Factories, and Public Buildings, heated by Steam, Low Pressure.

Woodward Building, 76 and 78 Centre street, corner Worth street, New York. Formerly 77 Beekman street
mar 14-1y GEORGE M. WOODWARD, Pres't

PUMPS
IN EVERY POSSIBLE VARIETY.

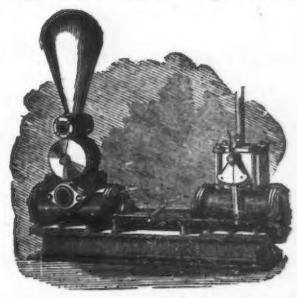


A. S. CAMERON & CO.,
FOOT 23d STREET, E. R.,
oct18:1y NEW YORK.

GUILD & GARRISON, MANUFACTURERS OF

Steam Pumps,
Vacuum Pumps,
Steam Engines,
Vacuum Pans,
And all the various connections. For sale at the STEAM PUMP WORKS, 26, 28 and 30 First street, Williamsburgh, N. Y.
s-p14-6m

Niagara Steam Pump Works.



CHARLES B. HARDICK,
9 ADAMS STREET, BROOKLYN, N. Y.
Sole Manufacturer of
HARDICK'S PATENT DOUBLE-ACTING
Steam Pump and Fire Engine.
Patented in England, Belgium and France. Send for circular. feb-13-1y

WOOD ENGRAVING
EXECUTED AT THE OFFICE OF
The Engineering and Mining Journal
No. 37 PARK ROW, NEW YORK CITY.

DUNCAN, SHERMAN & CO.,
BANKERS,
Corner of Pine and Nassau Streets, New York.
Issue Circular Notes and Letters of Credit for Travelers available in all the Principal Cities in the World.

TRANSFERS OF MONEY TO EUROPE AND THE PACIFIC COAST BY TELEGRAPH.
☞ Interest allowed on Deposits. feb-1y

AGENTS AND CANVASSERS WANTED
IN EVERY CITY AND TOWN IN THE UNITED STATES.
FOR THE
Engineering and Mining Journal.
Liberal inducements. Specimens sent free. Address
WESTERN & COMPANY,
37 Park Row, New York

Advertisements.

Advertisements admitted on this page at the rate of 40 cents per line. Engravings may head advertisements at the same rate per line, by measurement, as the letter press.

MACHINISTS' SUPPLIES.

B. F. STURTEVANT'S
PATENT IMPROVED
PRESSURE BLOWER,
FOR CUPOLA FURNACES AND FORGES.

Also manufacturer of the Sturtevant Patent Improved Fan Blower and Exhaust Fan. Send for illustrated catalogue.
B. F. STURTEVANT, 72 Sudbury street, Boston, Mass.

E. LYON.
MANUFACTURER OF
Patent Portable Hydraulic Jacks
and Punches.
NO. 470 GRAND STREET, NEW YORK

For Raising Heavy Weights, such as Locomotives Boilers, Guns, Heavy Machinery, Wrecking Purposes, putting together Water and Gas Pipes, pushing off Cranks and Propellers, Pulling, Proving Chains and Ropes, setting up Rigging, or Pulling Stumps, Punching and Shearing Iron, Die-Sinking, etc.

☞ IMPROVED PATENT HYDRAULIC JACKS, that run out their entire length in a HORIZONTAL or any other position.

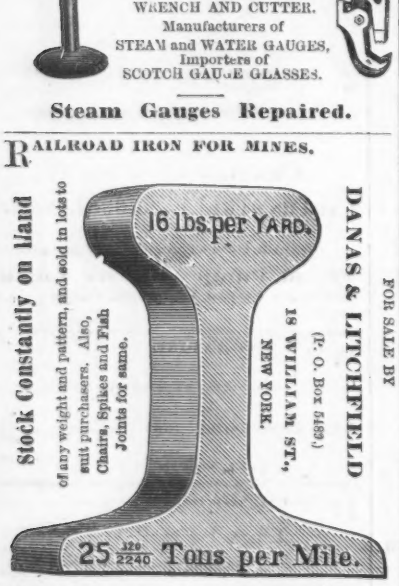
PATENT HYDRAULIC PUNCH,
For Punching Iron, Die-Sinking, etc. Ap 12;1y

H. A. ROGERS & CO.,
Successors to
JOHN ASHCROFT, and WALTON & Co.,
Railway & Machinists' Supplies,
50 and 52 JOHN STREET.

Sole Agents for
ASHCROFT'S STEAM GAUGE,
Also Agents for
LINDSAY WRENCHES,
STURTEVANT BLOWERS,
JUDSON GOVERNORS,
WILDER'S PATENT PIPE-WRENCH AND CUTTER.
Manufacturers of
STEAM and WATER GAUGES,
Importers of
SCOTCH GAUGE GLASSES.

Steam Gauges Repaired.

RAILROAD IRON FOR MINES.



Stock Constantly on Hand of any weight and pattern, and sold in lots to suit purchasers. Also, Chairs, Spikes and Fish Joints for same.

DANAS & LITCHFIELD
FOR SALE BY
(P. O. Box 5493.)
18 WALLIAM ST.,
NEW YORK.

Light Locomotives, for use in Collieries, Mines, etc.
mch13-6m

E. Allen & Co's
NEW MODEL
Cartridge Revolver.

Weight only 6 oz. Can be carried in the vest pocket. Seven Shots, 22-100 calibre. Lightest and best Revolver in the world.
Address, ETHAN ALLEN & CO.
WORCESTER, MASS.
22-6m

ENGINEERS' SUPPLIES.

STEAM ENGINES

FROM 4 TO 500 HORSE-POWER,
Including CORLISS PATENT CUT-OFF ENGINES, SLIDE VALVE STATIONERY ENGINES, and PORTABLE ENGINES. Also, IMPROVED CIRCULAR SAW MILLS, etc.
Send for Descriptive Circular and Price List.
WOOD & MANN STEAM ENGINE CO.,
UTICA N. Y.
Warerooms, 42 Courtland Street, New York; and 201 and 203 South Water Street, Chicago, Ill.
nov.7-1y-os

LAFLIN & RAND,
POWDER CO., 21 Park Row, opposite Astor House, New York,
invite attention to their facilities for delivering
BLASTING POWDER,
SAFETY FUSE,
ELECTRICAL BLASTING
APPARATUS, &c.,
wherever required, from having nine manufactories in different States, beside agencies and magazines at all distributing points. nov. 1:1y

B. KREISCHER & SON,
New York Fire Brick

AND
STATEN ISLAND
Clay Retort Works.
Established 1845.

Office, 58 Goerck Street, Corner Delancy Street, East River, New York. mar28-1y-q

Four First Premiums, American Institute, 1870.
THE ALLEN ENGINE WORKS,
Fourth Av. and 130th and 131st Streets,
New York City.
MANUFACTURERS OF
THE ALLEN ENGINE
PORTER'S GOVERNOR,
The Allen Boiler, and
STANDARD STRAIGHT-EDGES,
Surface-Plates, and Angle-Plates.
Four First Premiums awarded at the Fair of the American Institute, 1870.
Send for an Illustrated Circular.

Fishkill Landing Machine Works,
Established 1853.
FISHKILL-ON-THE-HUDSON, N. Y.

STEAM ENGINES,
Iron and Brass Castings, Forgings, Boilers, and Machinery.
Sole Manufacturers of the celebrated LOOMIS STEAM ENGINE, with Patent Variable Cut-off by the Governor.
Jobbing and Repairs promptly attended to.
JAS. L. TELLER, Secretary. MILO SAGE, President
sept13:1y

WILLIAM R. TAYLOR,
Kings County Steam Boiler-Works,
MANUFACTURER OF
High and Low-Pressure Steam Boilers.
ALSO,
TAYLOR'S PATENT UPRIGHT RETURN TUBULAR BOILERS,
TANKS, GASOMETERS, SUGAR PANS, COOLERS,
OIL-STILLS AND OIL-TANKS.
ALSO,
ANDERSON'S Improved Machine for
GRINDING SEATS OF VALVES.
Nos. 345 and 347 First Street,
(Old Nos. 277 and 279,
Near North Fourth, (P. O. BOX 213.) Brooklyn, E. D.
J. M. RING, Sole Agent, 265 Broadway, New York.
☞ Special attention given to repairs. dec6-6m

NEW YORK BELTING AND PACKING COMPANY. The oldest and largest manufacturers in the United States of
Vulcanized Rubber Fabrics,
Adapted to Mechanical Purposes,
invite the attention of all who are interested in the sale or use of such articles to the high standard quality and low prices of their various manufactures, comprising
Machine Belting, Steam Packing, Leading Hose, Suction Hose, Car Springs, Wagon Springs, Billiard Cushions, Grain Drill Tubes,
etc., etc., etc.,
"TEST" HOSE
made expressly for the use of Steam Fire Engines, and will stand a pressure of 400 pounds per square inch. Officers of Fire Departments requiring new hose, will find this much superior in strength and quality to any other.

PATENT SOLID EMERY VULCANITE WHEELS, a composition of rubber and emery, making a very hard uniform substance of the nature of stone throughout. These wheels for grinding and polishing metals, "gumming" saws, etc., are the most economical and effective tools that can be used.
WAREHOUSE, 37 AND 38 PARK ROW, NEW YORK.
JOHN H. CHEEVER, Treasurer.
☞ Price lists and further information may be obtained by mail or otherwise on application.
oct30-1y-os

COAL SHIPPERS.

HONEY BROOK COAL COMPANY, Exclusive Miners and Shippers of the Celebrated
Honey Brook Lehigh Coal,
23 Trinity Building,
No. 111 BROADWAY, NEW YORK.
Wharves, Elizabethport, N. J. Philadelphia office 209 Walnut street.
ap20-1y J. B. McCREARY, President.

WHITE, FOWLER & SNOW.
Wilkesbarre and Lehigh Coal,
FOR STEAM AND FAMILY USE.
OFFICE
Room No. 75, 111 BROADWAY, (Trinity Building).
jan1-1y JNO. WHITE,
LINDLEY H. FOWLER,
LOUIS T. SNOW.

THE NEWBURGH ORREL COAL COMPANY.
Mines at Newburgh, Preston Co., W. Va.
Company's Office, No. 52 S. Gay St. Baltimore, Md.
C. OLIVER O'DONNELL.....President.
CHAS. MACKALL.....Secretary
This Company offer their very superior Gas Coal at lowest market prices.
It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.
It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York, the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y., the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I.
The best dry coals shipped, and the promptest attention given to orders. sep21-1y

RANDOLPH BROTHERS, Sole Agents of the original
Spring Mountain Lehigh Coal.
Extensively used for Smelting Iron.
☞ Rooms, 28 and 30 Trinity Building,
pr6tf NEW YORK.

WILKESBARRE COAL, DELIVERED DIRECT from the Mines of
The Wilkesbarre Coal and Iron Co.,
or for re-shipment at
HOBOKEN AND JERSEY CITY.
OFFICE:
ap1-1y 80 Broadway, New York.

POWELTON COAL AND IRON COMPANY
Sole Shippers of the Celebrated
Powelton Semi-Bituminous Gas
AND ANTHRACITE COALS,
104 Walnut street, Philadelphia.
BRANCH OFFICES:
New York, Trinity Building; 17 Doane street, Boston
Cleveland, O.; Fittsburgh, Pa. jan30-1s

THE DESPARD COAL COMPANY OFFER their Superior DESPARD COAL to Gas Light Companies throughout the country.
MINES IN HARRISON COUNTY, West Virginia.
Wharves, Locust Point, Company's Office, No. 29 South st. } Baltimore.
AGENTS:
PARMELE BROTHERS, No. 32 Pine street, New York.
BANGS & HORTON, No. 31 Doane street, Boston.
Among the consumers of Despard Coal we name Manhattan Gas Light Co., New York; Metropolitan Gas Light Co., New York; Jersey City Gas Light Co., Jersey City N. J.; Washington Gas Light Co., Washington, D. C. Portland Gas Light Co., Portland, Maine.
☞ Reference to them is requested. may30-1y

LEWIS AUDENRIED & CO., MINERS AND Shippers of the following celebrated
ANTHRACITE COALS.
From Philadelphia and the Mines,
DIAMOND, Red Ash; SPOHN, Red Ash; ORCHARD, Pink Ash; BROAD MOUNTAIN, White Ash; LOCUST MOUNTAIN, White Ash; BLACK HEATH, White Ash; Old Company's Lehigh; Wilkesbarre.
From Port Johnston and Jersey City,
Old Co.'s Lehigh, Hazleton, Wilkesbarre, and Shenandoah Coals.
Also the superior CUMBERLAND COALS.

BROAD TOP,	BARTON,	BARTON,
SEMI-BITUMINOUS,	GEORGES CREEK,	GEORGES CREEK,
at Philadelphia.	at Baltimore.	at Alexandria.

205 Walnut street, Philadelphia; 14 Kilby street, Boston, 34 Westminster st., Providence; 24 Second st., Baltimore, 110 BROADWAY, NEW YORK. Jan13.y

G. B. LINDERMAN & CO.,
MINERS,
Sugar Loaf, Lehigh Coal.
OFFICE, 50 TRINITY BUILDING, 111 BROADWAY
may23-1y NEW YORK.

COXE BRO.'S & CO., CROSS CREEK COLLIERY Miners and Shippers of the Celebrated
Cross Creek Free Burning Lehigh Red Ash COAL.
FROM THE BUCK MOUNTAIN VEIN.
OFFICES:
Philadelphia, No. 341 Walnut street.
Drifton, Jeddo P. O., Luzerne Co., Pa.
Agent in New York, SAMUEL BONNELL, Jr.,
Room 43, Trinity Building,
feb-1y 111 Broadway.

SAMUEL BONNELL, JR., OFFERS FOR SALE his SUGAR CREEK and HONEY BROOK
LEHIGH COALS,
OFFICE:
43 and 45 TRINITY BUILDING, 111 BROADWAY,
NEW YORK. Jan:1y

$5 TO $20 PER DAY, AND NO RISK. Do you want a situation at or near home, to introduce our new 7 strand WHITE wire CLOTHES-LINES, to last forever? Don't miss this chance. Samples free. Address,
HUDSON RIVER WIRE WORKS,
75 William st. N. Y., or 16 Dearborn st. Chicago, Ill.
1t

MICROSCOPES FOR SCIENTIFIC INVESTIGATIONS and Educational Purposes. Price list sent free. T. H. McALLISTER, Optician,
Dec21-6m. 49 Nassau street, N. Y.

MISCELLANEOUS.

Mount Savage FIRE BRICK.
GOVERNMENT STANDARD
Manufactured by the
Mount Savage Fire Brick and Mining Company.

This Company having acquired the Fire Clay properties and Brick Works of the
Consolidation Coal Company,
will receive orders for their unequalled FIRE BRICK for Blast, Puddling, Smelting and Glass furnaces. Diagrams of shapes and prices will be furnished on application to
J. S. MACKIE, Pres., 90 Broadway, New York.
JAMES A. MILLHOLLAND, Vice Pres.,
Dec. 7.tf Mount Savage, Maryland.

THE BISHOP GUTTA-PERCHA WORKS,

422, 424 & 426 East 25th St.
Office at Factory, NEW YORK.
SAMUEL C. BISHOP, Proprietor.
The *only* manufacturer in the United States of every variety of goods, made from *Pure Gutta-Percha.*

SUBMARINE TELEGRAPH CABLES.
Submarine Wires, insulated for Mining and Blasting use.
Telegraph and Electric Wires for office and other uses of all sizes; Cotton and Silk Covered Wires, of all sizes. Bishop's Compound Cordage for air lines and outside connections; Underground Wires, covered with Gutta-Percha and Lead protection; Underground Wires, with fibre and Bishop's Compounds.
Any kind required made to order.
In addition to Telegraph and Electric Goods, I make all kinds of Pure Gutta-Percha goods, such as Belting for use in Water; Sheet for Surgical use; Sheet for various Mechanical uses; Lining for Acid and Chemical Baths; Bottles, Pitchers, and Funnels for Acids; Tissue Sheets for Caps and Hats; Soda and Beer Pipe; Boxes for Flax Machinery, etc., etc.
N. B.—TILLOTSON & CO., 8 Dey street, New York, and BLISS, TILLOTSON & CO., 247 South Water street, Chicago, are General Agents for the sale of any Telegraph and Electric Goods made by me, at Factory prices.
JOHN THORNLEY, 503 Chestnut street, Philadelphia, Pa., is Agent for the sale of any goods made by me at Factory prices.
☞ Orders also received at Factory for all kinds made.
Any goods of my manufacture, "excepting Telegraph and Electric Goods," are for sale in New York, by H. G. NORTON & CO., 26 Park Place; RUBBER CLOTHING CO., 347 Broadway; A. D. & C. A. HODGMAN, 201 Broadway, N. Y. sept13:4m

THE BEST TURBINE WHEEL.
SWAIN'S
Gave 5 **Per Cent.** better results at the **Lowell Test** than any of its **Highly Polished Competitors.**
It will give from 30 to 100 per cent. more power, in proportion to its size, than any other wheel.
Guaranteed to give from 10 to 50 per cent. more power, with the same water, than any other wheel in the market. It is the best made, most compact, runs longer without repairs, and gives better satisfaction than any other wheel.
☞ Send for report of tests, with description and diagrams.
SWAIN TURBINE CO.,
Dec 6:6m **North Chelmsford, Mass.**

HORTON, MABIE & CO.
PEEKSKILL, N.Y. & PERTH AMBOY, N.J.
Fire Brick Works.
MANUFACTURERS OF ALL SHAPES OF
NO. 1 FIREBRICK,
For Furnaces, Rolling Mills, Forges, Steel-Works, Lime Kilns, Cupola Furnaces.
BLOCKS AND TILES,
For Blast Furnaces, Gas-Works, Malleable Iron-Works, Bakers' Ovens, Green-Houses, etc. Stove-Heater, and Range Linings, Cylinders, etc., of every description, to order.
FIRE-CLAY, KAOLIN, FIRE SAND, FIRE-CEMENT,
ov1-1y IN BULK OR BARREL.

MACHINISTS' SUPPLIES.

HYDRAULIC WORKS.
MANUFACTORY,
BROOKLYN, N. Y.
Steam Pumping Engines, Single and Duplex, Worthington's Patent, for all purposes, such as Water Works Engines, Condensing or Non-condensing; Air and Circulating Pumps, for Marine Engines; Blowing Engines; Vacuum Pumps, Stationary and Portable Steam Fire Engines; Boiler Feed Pumps, Wrecking Pumps.
MINING PUMPS,

Water Meters, Oil Meters; Water Pressure Engines; Stamp Mills for Gold, Silver and Copper Ore; Eaton's Patent Amalgamators for Gold and Silver; Steam and Gas Pipe, Valves, Fittings, etc. Iron and Brass Castings.
☞ Send for Circular.
H. R. WORTHINGTON,
feb1-1y 61 Beekman street, New York.